amateur radio

VOL. 44, No. 6 JUNE, 1976

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COVER PHOTO

Bill Roper, VK3ARZ, the editor of AR, occasionally finds time free from producing the magazine to have a contact on the HF bands. Antennae in use include a trapped dipole for 80 and 40 metres and a 3 element monoband beam for 20 metres.

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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amateur radio

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QSP MORE MEMBERS NEEDED

During April, while attending the Inter-Regional meeting of the IARU, it was my privilege to confer with the major leaders of amateur radio affairs from throughout the world. The subjects discussed were many and varied, but were all of vital importance.

As Noel Eaton VE3QJ, President of IARU said, during the next few vital years leading up to WARC 1979 it is of utmost importance for every amateur in the world to support his local Society, thus giving backing to the team working on his behalf to preserve amateur radio frequencies and privileges.

The WIA is committed to represent the amateurs of Australia in the preparation of the Australian brief for WARC '79.

We are also committed to assist, through the medium of the IARU, other countries. Countries not as well situated, insofar as resources are concerned, as ourselves.

It is important that the membership of the WIA is as great a percentage of licensed amateurs as possible. The more members the more encouraging it is for those who give their time to look after the interests of all amateurs in this country.

More members also means that the financial burden is spread a little less heavily on each.

Will you do your bit to encourage more amateurs to join the WIA.

Remember WARC '79.

DAVID WARDLAW, VK3ADW,
Federal President, WIA ■

EDITOR'S DESK

Bill Roper, VK3ARZ

As I write this comment, it is the eve of the 1976 Federal Convention to be held in Melbourne.

Representatives from all States, as well as members of Executive, are taking leave from their families, and jobs (without pay or with a corresponding loss of holiday time), to meet for three days. They will argue, plead, hassle; some will be triumphant, some disappointed. But they will all be doing their utmost to further and improve our hobby of amateur radio.

These people are giving up their time to be INVOLVED in the administration and furtherance of our wonderful leisure time activity.

Are you an INVOLVED amateur? Or are you a spectator amateur?

Each committee, sub-committee and co-opted office holder of the federal body of the WIA submits a report to the Federal Convention. Many of these reports are lengthy.

As editor I also have to submit a report relating to the activities of the Publications Committee. Many thousands of words could have been written about the many happenings during 1975, the tremendous amount of work performed in their spare time by a handful of volunteers to produce your magazine.

Here is the Publications Committee report for 1975:—

AMATEUR RADIO

Despite the disastrous fire at the commencement of the year, AR has continued to improve.

A change of printer resulted in a more professional operation at a saving of thousands of dollars.

Most members of the committee contributed well to publication of AR, but with an average delay of nine months in publication of submitted articles, it is obvious we are in urgent need of assistance, particularly drafting and technical editing.

We also need more quality articles and photographs.

Tom Cook, the advertising representative, continues to justify his appointment; Peter Dodd is a vital and indispensable part of AR.

The lack of assistance from most areas of Australia is still a regrettable but expected disappointment. AR is not a commercial magazine published for the enjoyment of dispassionate subscribers/purchasers. It is *our* magazine — a house magazine of the WIA — a magazine of involvement — a forum for ideas — a vehicle for education and for dissemination of news to and from members.

AR is now of world standard. But an enormous work load falls on too few — a few who cannot continue indefinitely without aid and replacement.

AR is oftentimes the only tangible benefit of membership of the oldest radio society in the world; it is essential that it not be allowed to lose its individuality.

CALL BOOK

The committee is willing to edit and publish a call book, PROVIDED the call sign/address listings are made available to us in EDP format. We cannot assume responsibility for preparing this information.

MAGPUBS

Magpubs continues to be a relatively successful venture. ■

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TECHNICAL DATA

Frequency Range: 5 Hz to 35 MHz or 30 to 200 MHz.
Accuracy: ± time base stability + 1 count.
Display Digits: 8 digits.
Gate Time: 1 mill-sec. or 1 sec.
Indicating Time: 0.1 sec. or 1 sec.
Display Units: KHz and MHz.

Input Voltage: 20mV-20V p-p continuous (60V p-p for 10 sec.), 0.5-2V-rms in the range 30 to 200 MHz.
Input Impedance: 1m ohm or 50 ohm.
Input Capacities: 20 pF maximum.
Clock Crystal: 1 MHz.
Stability: ±0.0005% at 25°C, ±0.0025% at 5-40°C.

Aux. 1 MHz Output: 5V p-p.
Operating Temperature: 0-40°C (approx. 30-90°F).
Power Requirements: 100/110/117/200/220/234 V AC 50/60 Hz or 12 VDC.
Size: 220 (W) x 80(H) x 27(D) m/m.
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Now, you, too, can maintain the cleanest sounding signal on the band with the YO-100 Monitor Scope. Compatible with virtually all transmitters and transceivers, the YO-100 features wide range inputs for all mode monitoring — even RTTY. A built-in 1500/1900 Hz tone generator adds to the versatility of this station accessory. A full compliment of front panel controls allows operator control of all key adjustments. Complete your station with the versatile YO-100 monitor scope.

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TECHNICAL DATA

VERTICAL

Sensitivity: 200m V P-P/cm.
Frequency Response: 10 Hz to 40 KHz ±3dB 3180 kHz (455 kHz or 9 MHz inputs optional). Direct 10 Hz to 60 MHz.
Input Impedance: 500 K ohm.

HORIZONTAL

Sensitivity: 300m V/cm.
Frequency Response: 10 Hz to 10 KHz ±3 dB.
Input Impedance: 500 K ohm.
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Frequency: 1500 Hz and 1900 Hz.
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TECHNICAL DATA

Frequency Range: 1.8 MHz-200 MHz.
Impedance: 50 ohm unbalanced.
Power Scale: 0-6 watts, 0-30 watts, 0-150 watts.
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WIANEWS

The Secretary of the Darwin Club wrote to the VK5 Divisional Council, which in turn passed it on to the Executive, that it had been unanimously agreed that the monies collected in the Darwin Appeal Fund should go to the Club and not to individual members.

Accordingly Executive resolved to send a cheque for the full amount collected — $1084.38 — to the President of the Darwin Club with the request that the money should be used to acquire tangible assets for that Club. Future visitors would therefore be able to see how the donations were put to good use.

The possibility of publishing a call book during 1976 was further investigated during April. Unfortunately there are a whole host of problems connected with such a venture but nevertheless most had been brought into the daylight for examination and the Executive felt it was possible to put the facts before the Federal Convention for a decision one way or the other.

It was agreed that if a call sign book is produced this year there would be no alternative to its preparation from the membership EDP records as the starting point. The Publications Committee said they were prepared to undertake the task again so long as the call sign data derived from the computer records.

The Central Queensland Branch of the WIA in Rockhampton wrote requesting a representative from Executive to attend a convention to coincide with the City's Capricana Festival at the end of August or early in September. The Executive decided that every effort would be made to send a representative as requested and also thought it might be acceptable if the person concerned carried on to various North Queensland centres on the same trip if this might achieve any useful object.

Also on the Agenda was an invitation to the WIA to send a representative to NZART's Golden Jubilee Conference in Auckland early in June. The Federal Honorary Treasurer, Keith Roget, VK3YQ thought he could arrange something on his own account and if this materialises he would certainly be very pleased to attend on behalf of the Institute.

At the 1975 Federal Convention the Federal Council felt it was desirable to prepare guidelines for amateurs using the 11 m band. This has now been prepared ready for discussion at the 1976 Federal Convention and proved in fact to be somewhat more complicated than appeared at first sight because of all the other services in the band. Such a document should be of considerable assistance to Novice operators who may choose to use this band in preference to the segments licensed for their use in the 15 m and 80 m bands.

The Federal President visited the ARRL Headquarters in Newington Connecticut after his attendance at the IARU meeting and investigated the details of Novice licensing in the USA, amongst other subjects. The material he came away with will be very useful to the Institute in negotiations with Central Office. He also learnt about the big educational programme under preparation by the ARRL which indicates that the WIA are not alone in tackling this particularly important aspect of amateur radio.

Almost as soon as he returned from the USA and Canada the Federal President attended the second meeting of the Australian Preparatory Group engaged with the preparation of the Australian brief for WARC 1979. This was very largely a meeting devoted to administrative matters as might be expected this early in the proceedings. A second meeting of Committee 2 — the committee dealing with amateur matters — will be required before the next APG meeting towards the end of June.

As soon as the Federal Convention is over work will have to begin on preparing the WIA's submissions to Committee 2. A considerable volume of documents from overseas have already been accumulated to assist in the work. In addition there is a vast store of reports and papers from the past as reference material including such items as the 110 page Stanford Research Institute's searching enquiry into Amateur Radio — an International Resource for Technological, Economic and Sociological Development. The WIA are also most fortunate in having available the enormous experience and knowledge of international amateur radio affairs accumulated over many years by Michael Owen VK3KI.

Nobody has come forward to manage the Key Section whilst Deane Blackman VK3TX is overseas. A reply from "Central Office" advised they were prepared to authorise the use of AX calls during the period of H.M. the Queen's proposed visit to Australia next year to mark the 25th anniversary of her accession to the throne. A compromise attempt to have the AX call authorised for the first half of 1977 was also turned down.

A member very kindly sent in a copy of Section 4 — "RF Spectrum and Mobile Services" — of a publication by the ATC (NTP Branch — planning) entitled "Telecom 2000". Members who may be interested in the ideas circulating around the Telecoms Authority would be well advised to obtain a copy of this publication for themselves. A number of quotes from this were used in the Federal broadcast tapes during April in the hope that this one particular area of danger to amateurs on the VHF/UHF bands will be noted.

WIANEWS of April reported on a reply from the Minister about pirate activities. The Executive followed this up by asking the Minister if there is any intention to restrict or prohibit the importation and/or sale or disposal of transmitting equipment of a kind suitable for use or commonly in use by pirate operators without affecting supplies to legitimate users. Reports coming through from the USA indicate that CB radio over there appears to have become a gigantic headache in more ways than one.

Finally a quote from a Summerland Radio Club Committee report: "The success of a club or organisation would seem to be directly proportional to the amount of unstinted effort on the part of its leaders and inversely proportional to the apathy of its members". ■

TRY THIS

Ron Cook, VK3AFN

Bill Rice, VK3ABP

RE-USING AR ENVELOPES

By carefully slitting open the bottom of the envelope to remove Amateur Radio, it may be re-used for filing odd notes and circuits.

An envelope may hold the FT101 manual PLUS photostat copies of the various hints and kinks which have appeared in AR over the years. Thus all is together and no hunting required for information when required.

Suitable designation is made on the back top of the envelopes i.e. "FT101", "ANTENNAE", etc. — VK3ZIK. ■

The wire and plastic tie strips that secure the top of bread bags and other plastic packed food items should be saved, straightened out and re-used to cable up all of those straggling connections behind the operating desk. A dozen or so of these ties will convert a "rats nest" into a neat and tidy set up. — VK3OM. ■

QSP

CB

Reports from the USA press and other sources indictate that USA CB operations really have exploded lately with applications running around the half million mark each month and CB equipment now accounting for about 10% of the air freight carried from Japan to the USA. Truck drivers in the USA appear to be major users of CB equipment to warn one another about speed traps, and local police carry CB gear to aid them in their work. Other comments heard are unprintable.

INWARDS QSL ADDRESSES

VK1 QSL Officer, G.P.O. Box 1173, Canberra, A.C.T., 2601.

VK2 QSL Bureau, C/o Hunter Branch, P.O. Teralba, N.S.W., 2284.

VK3 QSL Bureau, Mr. E. Trebilcock, 340 Gillies St., Thornbury, Vic., 3071.

(Outwards — Mr. W. L. Jackson VK3XM, 23 Maine St., Carnegie, Vic., 3163).

VK4 QSL Officer, G.P.O. Box 638, Brisbane, Qld., 4001.

VK5 QSL Bureau, Mr. Geo. Luxon VK5RX, 27 Belair Rd., Torrens Park, S.A., 5062.

VK6 QSL Bureau, Mr. J. Rumble, VK6RU, G.P.O. Box F319, Perth, W.A., 6001.

VK7 QSL Bureau, G.P.O. Box 371D, Hobart, Tas., 7001.

VK8 QSL Bureau, C/o VK8HA, P.O. Box 1418, Darwin, N.T., 5794.

VK9, 0, Federal QSL Bureau, 23 Landale St., Box Hill, Vic., 3128.

IARU REGION 2 CONFERENCE AND INTER-REGIONAL MEETING

Michael Owen VK3KI

Regions 1 and 3 of the IARU have already held conferences to determine their policy for WARC 1979. At its conference of national societies in Region 2 held in Miami, Florida, between the 11th-15th April, Region 2 has adopted a position consistent with the position already taken by the meetings of the other regions. There is, therefore, for the first time, co-ordinated world amateur service approach towards the most important ITU conference of the decade.

After an opening plenary session, the Conference split into three committees to consider the papers presented for discussion and decision. On the fourth day a final plenary session was held to ratify the decisions of the committees and to deal with other business including the election of a new executive committee to serve until after WARC 1979. The executive committee of Region 2 is —

President — V. C. Clark W4KFC.

Vice-President — P. Selderman YV5BPG.

Secretary — G. Reusens OA4AV.

Treasurer — P. L. Parker VP9GO.

Members — L. P. Caamano HI8LC, A. Chanes CE3ABZ, F. Zarrabe YN1IFI.

The national societies represented at this Conference were —

Argentina, Bermuda, Bolivia, Canada, Chili, Columbia, Dominican Republic, Ecuador, Guatemala, Honduras, Jamaica, Mexico, Netherlands/Antilles, Nicaragua, Paraguay, Peru, Trinidad, United States, Venezuela.

At the same time representatives of all three Regions, who were present in Miami for the Inter-Region Conference to be held at the conclusion of the Region 2 Conference, took advantage of the opportunity to meet informally. A formal meeting was held the day after the Region 2 Conference was closed. Taking part in these meetings were Region 1 — Louis v.d. Nadort, PA0LOU (Chairman) and Roy Stevens, G2BVN (Secretary), Region 2 — Michael J. Owen, VK3KI (Director), IARU Headquarters — Noel B. Eaton, VE3CJ, Richard L. Baldwin, W1RU and David Sumner, K1ZND.

In addition, also participating were from RSGB — John Allaway, G3FKM and Tim Hughes, G3GVV, The Japan Amateur Radio League — S. Hara, JA1AN (President), The Wireless Institute of Australia — David Wardlaw, VK3ADW (President), The Luxemborg Society — Jean Wolff, LX1JW, USKA, Switzerland — Harry Laett, HB9GA.

At the conclusion of the Inter-Regional Conference the following statement was issued.

IARU MEETING, MIAMI, FLORIDA — APRIL, 1976

Meeting in Miami, Florida, over a period of six days during April, 1976, officers and directors of the International Amateur Radio Union and its three regional organisations discussed in depth the problems facing radio amateurs in preparation for WARC-79, and solutions to those problems. Deliberations at those meetings resulted in the following actions:

(1) The need for close liaison amongst the regions was recognised, as was the desirability of conformity between the regions where possible. The avoidance of duplication of effort by the separate regions was also acknowledged. In lengthy informal meetings the representatives of the regional societies represented were able to prepare a basis for a position paper that could be used as a model by IARU member societies or others as appropriate.

(2) Detailed consideration was given to the frequency needs of the amateur service, as indicated by the position papers already submitted by several societies.

(3) Changes in various definitions and radio regulations were discussed at length.

(4) Consideration was given to the dates and importance of several regional and international meetings that are scheduled, and attendance of suitable amateur representatives was discussed.

(5) There was detailed comment on and analysis of the preparation in each region and by the several major societies represented.

(6) The president of IARU asked that there be a meeting of Roy Stevens, Michael Owen, Victor Clark, David Sumner, and himself in Geneva during September, 1976 (at the time of the IFRB Frequency Management Seminar) to finalise the document described in paragraph (1) above.

(7) It was agreed that there should be a guide available for those who might be travelling abroad and who might be willing and capable of assisting in WARC preparatory work. IARU Headquarters staff agreed to work on this.

(8) There was an analysis of the WARC newsletter and the functions it is supposed to be serving.

(9) There was extensive discussion of the problems which arise when there are competing societies in a country, and it was agreed to continue with the existing policy, which discourages official IARU contact with such societies.

(10) It was agreed that the contests and awards committee of ARRL would study the feasibility of establishing an IARU award, whose purpose is to encourage amateur knowledge of and interest in IARU.

(11) Finally, there was extensive discussion of the need for adequate amateur representation on each administration's delegation to WARC-79.

The group closed its final meeting on Friday, April 16, by emphasising the value of such face-to-face meeting and discussions, and with a pledge to maintain close communications by every means possible during these critical months of preparation for WARC-79.

PUTTING THE ALL-REGION CONFERENCE IN PERSPECTIVE

The International Amateur Radio Union is a fragile thing on paper. Its work is carried out by one of the National Societies that constitutes its membership and is nominated the Headquarters Society. The officers of the Headquarter Society ordinarily take corresponding positions in the IARU. No member society pays any dues, nor do the member societies elect the IARU officers. The whole burden is thrown on one Society which must determine the priority it gives that responsibility amongst all its other obligations to its members generally.

Facing the challenge of the 1979 World Administrative Radio Conference of the International Telecommunications Union, the American Radio Relay League as the Headquarter Society of the IARU has given a high priority to this responsibility. So that he can devote his full attention to the IARU, an ARRL Vice-President, Noel Eaton, VE3CJ, is President of the IARU, ARRL President, Harry Dannals, W2TUK, having declined the position in view of his other commitments.

The three Regions have developed their own regional organisation. Whilst each has a common aim, each Regional Organisation is structured a little differently or works a little differently. The newest and smallest (in terms of numbers of members), is the Region 3 Association The oldest and largest is the Region 1 organisation.

Why then was the first meeting of the representatives of the Regions and major amateur Societies so important? To meet the challenge of the 1979 WARC, the amateur service cannot waste resource. Duplication of effort is a waste of resource. Not to take advantage of the knowledge and experience of those who have it is a waste of resource. Not to take the last step and to formulate our position without recognising the differing needs and aspirations of different countries in different regions is a waste of resource. A simple failure to communicate on matters of common interest is a waste of resource.

That is why the All Region Conference was important. Perhaps Region 3 got more than it gave, but that is in the nature of things. It is as important to amateurs in those countries where the administration has in the past been the stout defenders

of the amateur service that these administrations remain our defenders as it is that other countries support the legitimate aspirations of the amateur service. The ITU has no proportional representation. The United States of America has one vote, so does Nauru.

I believe that the All Region Conference achieved what it set out to achieve; the Regions are not parts larger that the whole. Each region is interlocking with the other regions and IARU Headquarters. The positive policy, set out in the formal statement, is the tangible evidence of this. It is true that no earth-shattering decisions were made. That was not the function of the Conference. A positive program, based on mutual understanding and with the benefit of the advice of those experienced in the different aspects relevant to that program, is the real achievement of Noel Eaton's vision of an Inter-Regional conference.

Whilst the Region 3 Association was represented by one of its four Directors, it was significant that the largest and the next largest Society in the Region were also represented by the respective Presidents, Shozo Hara, JA1AN (JARL) and David Wardlaw, VK3ADW (WIA). The IARU cannot exist independently of its member Societies. The member societies are together the IARU. The representation of these two Region 3 Societies, as well as RSGB and the presence of the Region 2 Societies, was a large factor in reaching the mutual understanding to which reference has already been made.

In evaluating the worth of the Inter-Region Conference I suggest we can be reassured that the IARU recognises the differing needs and pressures in different countries in different Regions, confident in the co-ordination and co-operation between the Regions and the Headquarters in preparation for the 1979 WARC, grateful for the breadth of experience and insight of those contributing to the amateur case and thankful that ARRL as IARU Headquarter Society is "making it all happen".

There is, however, one thing that we cannot be. We cannot be complacent about the future. ■

"COSMO FRIENDS OF KAWATANA" RADIO CLUB

Des Greenham, VK3CO
23 Stewart St., Seymour, Vic. 3660

Many VK stations may have spoken to Chitary, a very active Japanese operator who spends a great deal of time on 15 metres. Chitary, more recently JA6THP, was originally JH6ZCY, a Club station.

It may not be generally known that Chitary is a patient of a large national hospital in Kawatana near Nagasaki in the Southern part of Japan. Chitary, unfortunately, contracted progressive muscular dystrophy (PMD) when very young and is confined to this hospital. His movements are limited and he is under constant medical care.

He is only one of many such patients in this large hospital and, in an effort to communicate with other people, Chitary taught himself English, qualified as an Amateur operator, and formed the "Cosmo Friends of Kawatana Radio Club" in the hospital. There are now 13 licensed operators of JH6ZCY, the station call. Chitary recently established his own station with call JA6THP, in his hospital room. His equipment is set up on a bed trolley and his antenna, a 4 element Yagi, is mounted on the hospital roof with a remote rotator control. From here he can talk to the world through amateur radio.

Recently, when visiting Japan, it was decided to make a special effort and visit a friend in Nagasaki. "All Nippon Airways", a large Japanese domestic airline, operate regular and frequent flights from Osaka to Nagasaki. So, one morning, bright and early, the Boeing 737 was boarded for a quick flight to Nagasaki. A pleasant and scenic taxi trip to Kawatana followed, and a special "eyeball" QSO

VK3CO with some members of the club at Kawatana. Chitary, JA6THP is on extreme right.

took place with these very unique handicapped operators. Everyone, including the hospital staff, were most hospitable and friendly. Despite a language barrier, communication was achieved using drawings, diagrams, and even hand gesticulations amid roars of laughter from everyone . . .

Whilst there, it was learnt that another VK operator had visited there only weeks before — this was VK2XT Bill, who also has regular contacts with the stations at Kawatana. It was good to see an Australian boomerang QSL on the wall of Chitary's shack midst many other DX souvenirs. A special QSL from VK3CO in the form of a polished wooden map of Australia was presented with due ceremony and added to Chitary's collection.

Lunch was provided by the generous hospital staff and, naturally rice formed the major part. This, however, presented no difficulty but the chop sticks certainly did . . . The clumsy efforts of this visitor from "Down Under" with the chop sticks, created a comedy interlude for these wonderful people of Kawatana.

Finally, it came time to leave . . . It was with mixed feelings that the "International" Eyeball QSO with such a remarkable group came to a close.

A car trip to Nagasaki airport through the courtesy of one of the medical staff and jet plane to Osaka completed the day's adventure.

Since returning to Australia, regular skeds are kept with Chitary and his Club. His situation is more clearly understood and his courage and determination admired and appreciated.

The "Cosmo Friends of Kawatana" radio club is now two years old. On February 22nd last, special celebrations were held to mark this occasion. Skeds were arranged with stations in many countries for this day and fortunately conditions on 15 metres were very good. Contacts were made and friendships reaffirmed in many parts of the world. The club operators are very active on 15 metres, and should you hear a call from any of the operators in the hospital, JH6ZCY or JA6THP, just call in and say "hello" — your contact will really be appreciated by these courageous people who are physically handicapped and confined within four walls. ■

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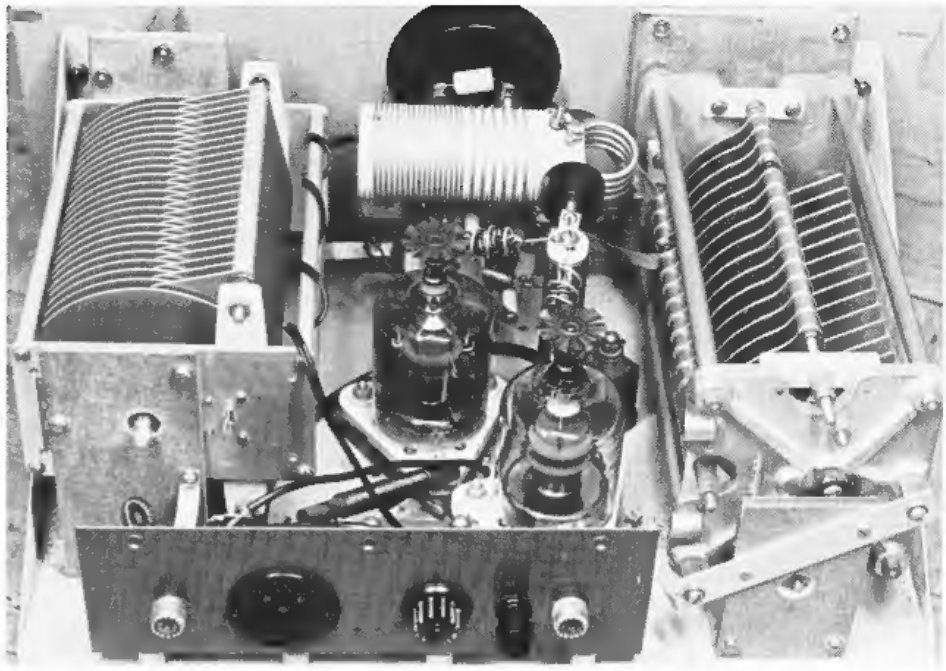
WE503

A LINEAR POWER AMPLIFIER FOR AUSTRALIAN CONDITIONS

PART THREE

R. A. J. Reynolds, VK3AAR



CONSTRUCTION DETAILS

As in most home brew projects, the final design of the 80 through 10 linear at VK3AAR was somewhat governed by the major items that were in the junk box, at the local disposals sources, and available from friends. The prospect of reproducing the amplifier about to be described in exact detail would be formidable. Many of the components are very much 'one off' in the writers experience, even though they must have been made in considerable numbers some years ago.

The VK3AAR junk box is quite extensive, but even so, did not extend to adequate tuning and loading capacitors, a Pi-coupler, a chassis and cabinet, or a convenient power transformer. There were of course a handful of minor components that had to be found. On reflection, these items represent the bulk of the amplifier, so it cannot be assumed that the VK3AAR amplifier will be all that different from any other attempt. One feature is worthy of note. The overall cost of such a unit is considerably less than that of a commercially available item. In my case, the total cost over and above the bits from the junk box was a little over $50. There is little doubt that I could have built an amplifier for even less cost by less suitable items from the junk box, such as TV power transformers strung up in series, an old chassis, chopped up broadcast condensers, and bits of copper wire wound into a Pi-coupler, but I considered that in order to present a prettier unit, a little money had to be spent.

The circuit diagrams are those shown in Figs 8 and 11. These circuits are of course flavoured by the components available. For example C3A and C3B could be replaced by a single variable capacitor 10 to 200 pF at about 5 kV spacing. In my case the available unit was 30 to 200 pF, and the stator had to be sectioned and switched to achieve a low capacity for the 10 to 20 m bands.

The theoretical derivation of the circuit was covered earlier in this series, and the prospective constructor would be well advised to become familiar with the reasons for the choice of each component. For example, whilst the range of value for C3 needs to be fairly close to the circuit value, that for C1 could be anywhere between 1000 and 3000 pF. Hence, the circuit value for C1 which is shown as 1800 pF, could be relaxed to 1000 pF in order to use a junk box component, whereas a 20 to 180 pF variable could hardly be used for C3 without additional padding for 80 metres and may be sectioning for 10 metres.

The following description is peculiar to the VK3AAR linear and the components that were available for its construction. Some concluding notes on tuning, testing and operating will be common to all amplifiers, although here again there is more than one way of doing a job, and the availability of support equipment will dictate the methods used by individuals.

The chassis, front panel, cabinet, complete with the two variable capacitors were purchased from surplus sources. This unit was originally an aerial tuning unit for an unknown service. It was apparently equipped with plug-in coil units designed to cover a range of frequencies. Evidently 50 or more of these ATUs have appeared in Melbourne in recent times, and possession of such a unit would make the construction of a linear somewhat easier.

The two variable capacitors in the ATU are a Jennings 1000 pF air variable rated at 3500 Volt spacing and a 30 to 200 pF air variable of unknown manufacturer, which would appear to be about 6000 to 6000 Volt rating. These capacitors serve as the loading and tuning capacitors. The identification on the front panel is even correct.

Because of the design of the plate tuning capacitor, the minimum capacity was too large for operation on 10 and 15 metres, and the setting somewhat too close to the minimum capacity for convenient use on 20 metres. This situation was remedied by sectioning 4 of the stator plates so that only these four were in circuit for the higher frequency bands. This involved dismantling the unit, cutting the stator support rods at the appropriate point, threading each of the cut ends and fitting these ends with a fairly thin nut, so as not to cause arcing between the stator sections on the higher bands. Care must be taken not to strain the ceramic insulators that support the stator assembly, or an annoying fracture may occur. No additional support was required for this unit as there are three support rods for each section.

Provision was made to switch the extra section into circuit for operation on 40 and 80. It would of course be most convenient if this could be ganged with the band change switch, but this does create some problems. There is a spare set of contacts on the Willis Pi-coupler that I used, however the switch failed almost instantly when used for this purpose. The RF voltage present on the switch that couples this extra C is in the order of kV's and somewhat special precautions must be taken. If there is plenty of room a large ceramic switch or a mechanical coupling to a special second switch could be used. Alternatively a separate control on the front panel might be used for 10-15-20 in one position and 40-80 in the other.

Several attempts were made to repair, modify and eventually replace the switch supplied with the Willis Coupler. The final result was a somewhat elaborate ceramic

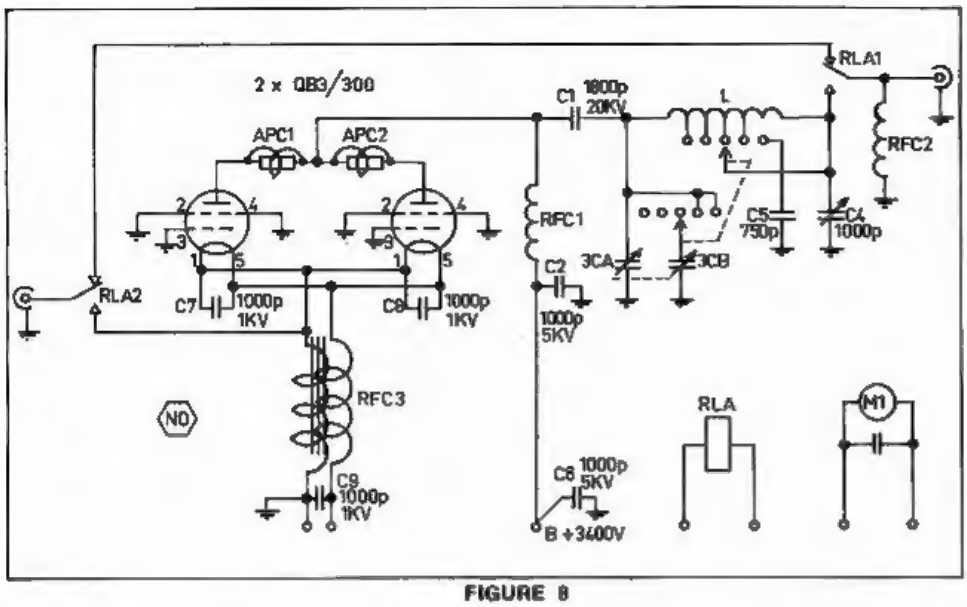


FIGURE 8

switch such as is found in some American surplus equipment. Although manufactured by G.E. this switch type has been publicised as being available from 'Radio Switch Corp' in recent years. It is a two pole switch, one of 5 positions on one bank and the other of two positions each in the 40 and 80 metre positions. The coil part of the Willis coupler was supported on the 5 connecting wires that went to the switch which was screwed to the front panel.

This coil assembly is designed specifically for use with a couple of 813s with 2 kV on the anodes, but I found that it worked well with the QB3/300s with 3.5 kV on the anodes, which represents a somewhat higher input impedance. However, I have one reservation. Under these conditions, the peak voltages present on the wafer switch which is part of the assembly, during operation on 20-40-80 metres, will cause switch failure under very high power operation. As a guide only, I discovered that the Willis switch, which incidentally has a 2 kV rating, failed during testing on 20 metres into a proper dummy load at an output power level of about 600 Watts single tone. The high RF voltage on the switch caused the wafer material to "cook". Needless to say, this power level should not be encountered in normal operation, and with moderate care, the Willis Pi-coupler is a very satisfactory unit.

The weaknesses in the switch will not be a problem in most cases, and it was pointed out to me that the increase in cost that would result from a change in the switch type would be great. So for the individual, the junk box plays its part again. The Willis Pi-coupler is available from William Willis & Co. Pty. Ltd., 77 Canterbury Rd., Canterbury, 3126, at a cost of $18 at the time of writing.

The Plate choke RFC1 has already been described, and can be seen in the photo. For reasons of safety considerable care must be taken in the choice of C1, the DC blocking capacitor. Whilst several manufacturers make suitable units, a locally available unit is the type HTD241 1000 pF 15 kV DCW available at moderate cost from Plessey in Sydney. The type used and shown in the Photo is the Plessey type HTX341 rated at 20 kV DCW available at higher cost also from Plessey.

The RF bypass capacitors, C2 and C8 were large mica block types found in one of the disposals stores. C2 was used to support the Plate choke which was drilled and threaded 2BA.

The aerial changeover relay was a 24 volt coil 2-pole changeover power relay, Omron type unknown, having somewhat heavier than normal contacts with a longer than normal throw.

The bypass condensers C7, 8 and 9 are 1000 pF, 1 kV disc ceramics, C7 and 8 being mounted underneath the tube sockets.

The filament choke has been described earlier, and was wired in point to point from the power input socket to the tube bases. The tube bases, with their ceramic standoff insulators were found in a surplus store, but they are available from commercial sources.

The smaller items have been discussed earlier in the series, or alternatively need no comment. Most exercises of this kind usually come up with a gimmick of some sort, and this is no exception. There is a need to provide a heat dissipating connector for the anodes of the QB3/300s. These were found from bits in the junk box, and consisted of an unknown top cap to which was fitted a transistor heat sink of the type which clips over the top of a TO5. The diameter of these heat sinks was about 3 cm.

A 4" 0-1 mA meter movement was fitted to the front panel in the hole that was originally occupied by a 0-5 A RF ammeter, to serve as an anode current meter. Before it was fitted it was stripped down and the calibrations changed to 0-0.5 A Ia. Letraset was used which provides an attractive finish, the unwanted lettering and numbers being removed using one of those plastic pencil erasers.

This essentially completed the construction of the RF part of the linear.

Power supplies are generally assumed to be fairly straight forward, but there are traps for the unwary, and gains for the astute. The VK3AAR power supply required two efforts, brought about by a change in plan from a 2 kV to 3.5 kV thinking. The first plan involved a condenser input CLC circuit which worked quite OK but did not allow the QB3/300s to run at their best efficiency. The change to 3.5 kV required a change in filter condenser from the working voltage point of view, and as the next higher voltage unit that was in the junk box was a 16 uF 8.5 kV monster that measured about 6" by 8" by 16", a new housing had to be provided. As it turned out, there was enough space in the original box that held the 16 uF for the rest of the power supply.

The power supply was built in the remains of a DC cardiac defibrilator that was acquired from an auction mart in Hobart when I lived in VK7 a few years ago. The main power transformer was found out in the rain at a Melbourne s plus store holding a door open, but at $6 was worth a try. A quick check over with a multimeter indicated one immediate problem, leakage. There was about 2 Mohms between the primary and the frame, and about 10 Mohms between the secondary and the frame after the obvious water had dried away. I cooked the winding by putting 500 mA DC through the secondary and 15 A DC through the primary, but I think that this only moved the moisture from one part of the transformer to another. Cooking in a slow oven for a couple of hours improved the leakage by a factor of 10, but it still was not good enough to my way of thinking. Incidentally, I had already AC checked the unit at an input of 20 Volts or so to check for voltage ratios and winding shorts.

It could be argued that I might have used the transformer as it was, but leakages of this kind would have caused receiver interference to say nothing of possible transformer failure.

The transformer was large, about 11" by 11" by 2½" iron stack, and of a construction that made disassembly possible, so this course was taken. The iron was pulled down, and even at this stage was found to have water between the sheets. The two secondary sections and the primary section were removed and stripped of their outer linen tape. These sections and the cheek plates were then placed in the kitchen oven at the lowest setting for about three or four hours. I had left a couple of terminal bolts in one of the cheek plates and checked the resistance between these two bolts from time to time. This monitoring point which started at 2 Mohms eventually went to 3000 Mohms.

Another hour in the oven and I proclaimed it well stewed, and set about replacing the removed linen tape with, first a layer of new linen, and then a couple of layers of ordinary PVC adhesive tape. The whole was reassembled, the electrical con-

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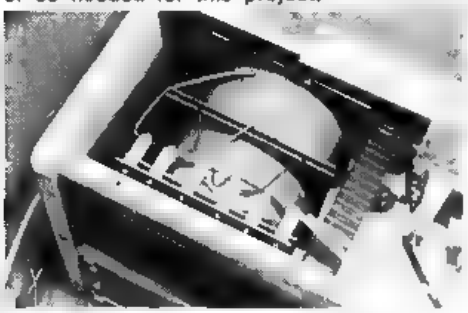
nections being made with ceramic standoffs from the junk box. The result?

The rebuilt transformer had leakages of much better than 5000 Mohms, the limit of my meter, between windings and between secondary and frame. Primary to frame was about 3000 Mohms, which is quite acceptable. So while this might seem like a lot of trouble, it did produce a somewhat difficult to obtain transformer for $3, 6 reels of tape, and a lot of fun.

The rectifier diodes were all manufacturers surplus OA626/50s which should have been 50 PIV 2 Amp. But when I checked them for their real PIV, I discovered them to have a yield of 50% greater than 1200 PIV, 40% at 1000 PIV and the remainder about 500 PIV. At only a few cents each, it was worthwhile going through a couple of hundred to get the 30 or so needed for this project.



The re-built power transformer

The remainder of the components in the power supply are all straight forward with the exception of the relay RLB. This was a long throw aerial changeover relay which came out of another ACU and looked as if it could break 20 kV

It is a fairly unconventional place to put a power control relay, but as I have already argued, I wished to keep the HT out of the linear box during standby.

Switching of the primary power and power to the relay control circuit, a voltmeter calibrated 0-5 kV and a suitable current shunt for the remote meter on the RF panel would normally complete the job. But I did not have a suitable filament transformer I could have wound one on a core recovered from an old broadcast receiver, but decided to put a few turns on the main power transformer. So a bit over 5 volts worth of the equivalent of 10 SWG wire was wound near the primary of the main transformer alongside the secondary sections, incidentally, after the transformer had been reassembled.

And now to the one strange feature of this unit. The power connection between the power supply and the final is a length of heavy duty 40/.0076 3 core power cable.

This piece of cable had a 440 VAC rating, but when I tried it out on a ionisation tester, it went to 20 kV before showing signs of distress, and then it might have been the connector that I used, that broke down a largish 3-pin Belling and Lee power connector with a 20 Amp rating. This cable carries the 2 filament wires, one of which is earthed, and the switched HT. This provides convenience with a certain degree of safety.

Setting up this power supply involves two adjustments, the current and voltage calibrations RV1 and RV2. The former can be set without power applied by means of a 1.5 volt dry cell and a multimeter all in series with a 5 ohm resistor. With the multimeter set to the 250 mA range and the circuit completed through the 1 ohm shunt, RV1 may be set to give the same reading as that shown on the multimeter. RV2 may be set with power on the supply, after measuring the HT with a high voltage probe. Don't take risks with the HT, borrow a proper x100 HV probe and associated meter if necessary.

If all goes well the unit is ready to use Fire it up, load it up and gain that extra 1½ "S-points". I performed some fairly extensive tests on my unit, to compare the overall result with my original targets, and it is not surprising since there was a certain amount of compromise, that the targets were not met in all cases. I did learn however, that it is very difficult to test an amplifier of this kind properly. I was not able to measure the intermodulation in a way that could be compared with the target. I could not arrange a 500 Watt load that covered the range of VSWR that I specified, neither could I measure the load impedance represented by the amplifier to the exciter. But even what I could measure was of limited value.

At this point in this article, I was going to list the shortcomings of the unit that I built including some solutions that I found. However these solutions were rather messy to say the least, and still did not completely remove the shortcomings. Considering the sequence of events and the subsequent developments, a narrative is of interest.

The problem was that the amplifier appeared to perform well on 20-15-10 metres giving full output, but only moderately on 40 metres (350 W PEP) and poorly on 80 metres (200 W PEP). For operation on 80 metres, the plate tuning condensor needed an additional 50 pF at the low end The loading capacitor was fully in mesh and with a dummy load of 50 ohms, appeared to be over oaded

All the same, the amplifier worked well on the bands where my interest lay and I was content to let others concentrate on the 40-80 bands should they require them. Then I decided to pursue the matter and considered the theory of operation of the Pi-coupler. What was the difference between the design of the Willis coupler and the required design for the QB3/300s? It was simply a matter of plate impedance, about 5000 ohms in the case of the Willis coupler that was designed for 813s and about 7000 to 8000 ohms required for the QB3/300s.

The solution was to increase the inductance of the coil on those bands where problems existed The tap for 40 metre operation was moved two turns towards the aerial end and an additional four turns were added to the coil at the aerial end Then all was well, the additional 50 PF was removed from the plate circuit and the whole unit performed well, 400 Watts PEP

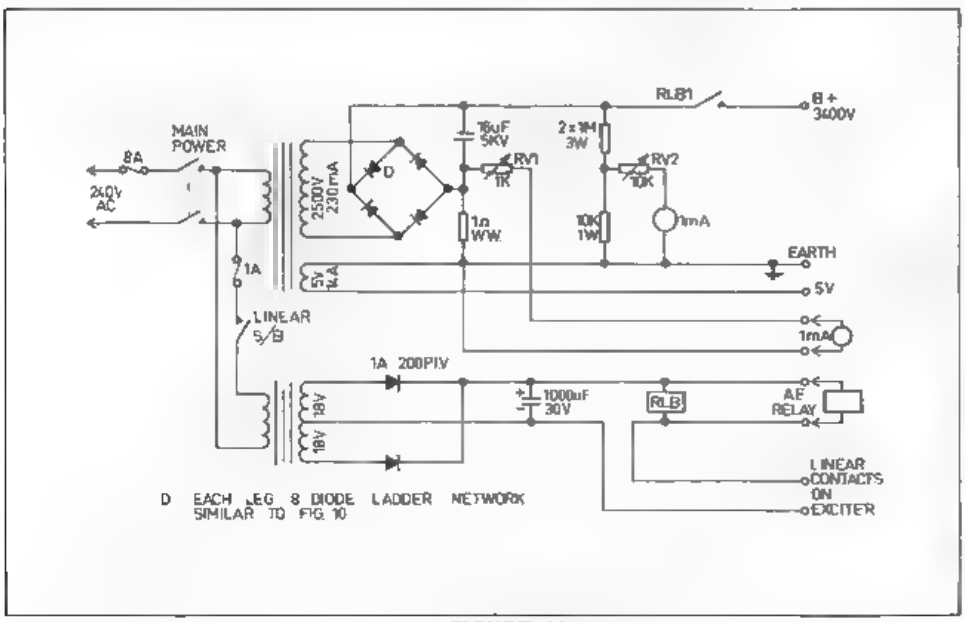
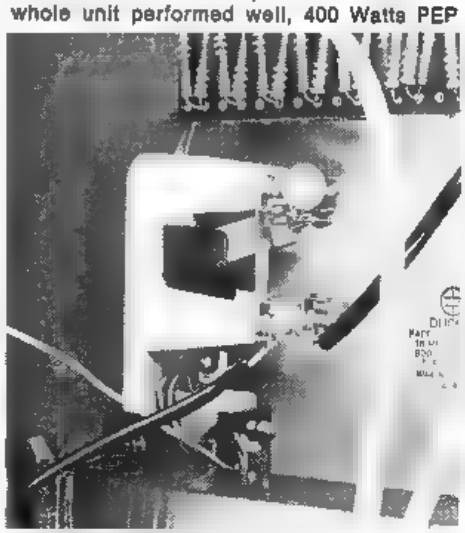


FIGURE 11



A close-up of relay RLB

on 2-tone test being achieved on all bands into a 50 ohm load With comments as required, the performance of the Amplifier was as follows, tested against the original specification.

FREQUENCY COVERAGE

The tuning did cover the Amateur Bands. Although I did not check it on 11 metres, I have no reason to suspect that it will not work there.

EXCITATION POWER

I did not test this fully, however on 10 metres 40 Watts single tone was required to raise 400 Watts at the output.

OUTPUT POWER

Using the approved 2-tone method of determining output power, at least 400 W PEP was achieved on all bands into 50 ohms, however it was noted that considerably higher cyllabic peaks were achieved, as follows: 80 m - 490 W, 40 m - 530 W, 20 m - 640 W, 15 m - 530 W and 10 m - 500 W. I commented earlier that this is due to the power supply regulation.

INPUT IMPEDANCE

This was not tested fully, but from the optimum position of the loading control on the exciter, it was obvious that the input impedance was higher than 50 ohms. On the other hand, I was surprised to observe that the VSWR at the input on 10 metres was better than 1.5:1 against 50 ohms

OUTPUT IMPEDANCE

On 20-15-10 metres, the amplifier seems to be quite tolerant of poor VSWRs. I have not had the opportunity to test the unit extensively on 40 and 80, but on my observations to date, high impedances should be catered for, but impedances lower than 50 ohms may require more loading capacity than exists at present.

INTERMODULATION PRODUCTS

I have concluded that the measurement of IM within the ham shack with equipment normally available is difficult if not impossible.

However I am indebted to Bob VK3SK for drawing to my attention a method of establishing the "cleanness" of a SSB signal Many SSB Transceivers and Receivers switch from upper to lower sideband by changing carrier crystals and at the same time shifting the VFO so as to leave the receiver calibration in the same place on the dial. Hence, a receiver set to resolve a SSB signal transmitting USB on 20 metres say, when switched to the LSB position, will be looking at a slot outside the pass band of the originating transmitter Any signal in the LSB position is unwanted in general, and its magnitude is a measure of the nonlinearity of the system. But remember that this also includes the inspecting receiver and the method breaks down when very strong signals are involved as receiver cross modulation starts to predominate As an example, a signal indicating S9 + 15 dB on a resolved USB might show S3 in the LSB position. If the output in the LSB position is intelligible then the problem is one of unsurpressed sideband and the test changes its meaning, but if it sounds like broken up ducktalk, then assuming 4 dB per S-point there is 6 times 4 plus 15 equals 39 dB of something. Pretty meaningless by itself, but that figure is certainly related to the intermodulation of the system. And if someone reports your LSB as being only 10 dB down on your USB then something is wrong. Figures of about 30 dB have been considered "clean" The amplifier in question? Reports have been received in the 30 to 40 dB area and appear to be about the same as the "barefoot" condition

This method of establishing just how clean a signal is, was the subject of some investigation on 20 metres recently when it was verified that whilst power levels from linear amplifiers and exciters involving tuning and matching adjustments do not vary very much with small changes in control settings, the LSB/USB figures as detailed above do change dramatically For example, a very clean signal from Bob VK3SK gave a figure of about 60 dB, but when he changed the setting of the preselector on his Collins S-line transmitter, although he noticed only a little power change, the LSB/USB figure degraded by some 20 to 30 dB! The only indication of change in performance at Bob's end was a distortion of the waveform on the monitorscope. This only emphasises how useful a monitorscope can be. Observation of the output waveform very quickly establishes the state of tune of the whole system Meter readings become only a check.

POWER SUPPLY

Condition met.

COMPLEXITY

The circuit is simple and straight forward, using no screen or bias supplies, no blower, only one tuned circuit.

SERVICE OF OPERATION

The condition is met, but it has already been observed that higher peak powers are available during low duty cycle voice waveforms without speech processing. So for this amplifier and power supply, there is some advantage in not using speech processing. A change to a regulated power supply would give a higher relative power during speech processing, but would limit the peak available power to 400 Watts by law.

COST

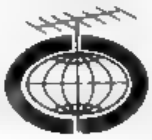
The total cost was of the order of $50 which must be considered low. The other part of cost, time, was fairly high. Several weeks of part-time fiddling and investigation were involved, the greater part being the work on the power transformer, and the various efforts on the band change switch.

On the other hand, there is a great deal to be learned from a project such as this. Not so much the process of the construction, but the exercise of solving problems for one's self from a combined theoretical/practical point of view. At the end of it all there is the satisfaction of saying over the air . . . "An FT101E into a HOMEBREW linear running the legal limit". ■

VICOM

antennas

NEW FM GAIN RINGO RANGER



The new Ringo Ranger ARX-2 2m omnidirectional offers 6dB gain over a ¼ wave whip. Features 3 half waves in phase and a 1/8 wave matching stub with an extremely low angle of radiation for better signal coverage. Tunable over a broad frequency range and perfectly matched to 52 ohm coax $35
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RM-20 (20 metres) [illegible]
MO-2 mast for above . . $26
BM-2 bumpel mount . . . [illegible]

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Midy MN trap dipole 40-10m $38
Midy VN trap dipole 90-10m $44
AL48DXN trap d pole 40-80m $38
AL24DXN trap dipo ee 20-40m $28
14AVQ trap vertical 40-10m $59

2 metres

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AS2108N twin boom, 18dB gain $99
AS 210AN single boom, 14.5dB gain $38
ARX-2 (Ringo Ranger) 6dB gain $35

Crossed Yagi, 7 elements with adjustable gamma match with gain approx 7dB. Precut with all hardware but not including mounting to mast. Ideal for Oscar, fm and ssb $65

ANTENNA ACCESSORIES

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CD44 medium duty rotator with control unit $135
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AS-BL Balun $18
Rak dipole balun $22
AS-GM gutter clamp with cable and connectors $10
RG58AU coax cable 45c per metre

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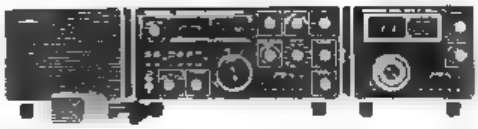
Leader LPM885 swr/power meter $78
ME-UA pwr/swr meter for UHF (max 15w) $69
SW410 144-430 mHz, no power calibration required, direct reading. Quality construction $58

VICOM FOR PERSONALISED SERVICE

For the novice simple conversion instructions are available for Uniden, FTIOIE, TS-520 to reduce power to meet novice requirements.

HF TRANSCEIVERS

uniden "... the best value."

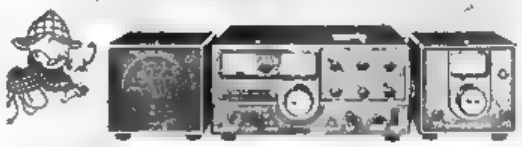


The Uniden 2020 features phase locked loop circuitary for optimum stability, separate usb/lsb/cw 8-pole crystal filters as standard and 6146B's in the final with screen voltage stabilisation for minimum distortion products and a very clean output signal. The rig is produced by the Uniden Corporation who are well known in the commercial and CB markets and manufacture over 45,000 transceivers per month! This rig features maximum accessibility to plug in PCB modules and even the front panel can be swung out for easy servicing. A full spares catalogue is available together with change-over PCB's. Compare the Uniden 2020 with other HF transceivers and you'll be quickly convinced that it offers the best value! The price $570 includes mic, cables, plugs, English manual and VICOM 90 day warranty.

Uniden 2020 80-11m transceiver, complete $570
Uniden external PLL VFO $115

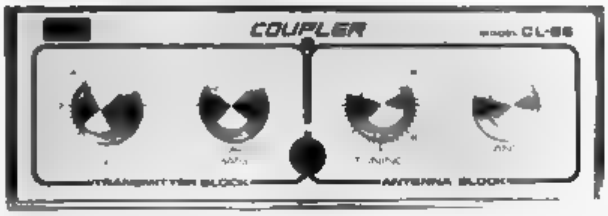
Atlas 210 x 80-10m solit-state mobile including noise blanker $695
Atlas AR-230 AC power supply $165
Atlas Delux mobile mount (DMK) . . . . . $ 55

TS-520 SERIES



Kenwood TS-520 80-10m transceiver $598
Kenwood TS-900 — out of production
Yaesu FT101E 160-10m transceiver, complete $670
Yaesu FL2100B linear amplifier $430
Yaesu FT75B mobile transceiver $280
— FP75B AC power supply . . . . . $ 70
— DC75B DC power supply . . . . . $ 75
* special rig + 2 power supplies $400

ANTENNA COUPLERS



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EQUIPMENT REVIEW —

THE YAESU FT-221

It is interesting how fashions change in amateur gear. A year or two ago, FM on the 144 MHz band was all the rage. However, while FM is still well up the list on the popularity poll, it seems that it will soon be overtaken by the new FM-SSB-CW-AM transceivers that are appearing on the market. The first of these combination rigs to arrive on the Australian market is the Yaesu FT-221.

Actually the FT-221 is the first of these transceivers to have full coverage of the two metre band from 144 to 148 MHz. Yaesu previously produced the FT-220 which had similar functions but tuned only to 146 MHz and with a few slight modifications was usable in our FM portion of the band.

The FT-221 covers the two metre band in eight segments of 500 kHz. Insofar as facilities are concerned, the FT-221 has everything that the modern HF SSB transceiver incorporates. Such things as VOX, receive and transmit off set tuning, 100 kHz calibrator, noise blanker, 1 kHz main tuning dial read out, 'S' meter with switchable functions of relative RF output and discriminator (zero centre) indicator.

Naturally the set is fully solid state and uses a total of 60 transistors, 18 FET's, 13 integrated circuits, 1 programmable unijunction transistor, 115 diodes plus one thyristor and one varistor. Quite a line up. All of this is fitted into a very compact cabinet measuring only 200 mm wide by 125 mm high by 295 mm deep. In terms of comparison this is quite a bit smaller than say an FT-101. However, for its size, it is quite a solid package, weighing 8.5 kg.

Much use is made of plug-in computer type circuit boards in the construction of the FT-221 and this makes it possible for the large number of components to be fitted in in an orderly fashion. The self contained power supply allows for operation from both 240 volts AC and from 12 volts DC. The FT-221 is therefore highly suitable for both base station and mobile operation. Selection of either mode is automatic with the connection of the appropriate power cord

In addition to the accurate dial, it is possible to crystal lock the transceiver and operate it in a similar way to the switched channel select FM sets. There is, however, one interesting difference and that is that each crystal provides eight operating frequencies, each in the same relative place on each of the eight band segments. In addition to this only one crystal is required to produce both the transmit and receive function.

Apart from the main tuning dial, no other tuning or peaking control is provided or needed to operate the FT-221. Extensive use of varicap diodes to tune the receiver front end and the transmitter exciter stages keeps the critical circuits on the nose. All of these varicaps are adjusted by a bank of present potentiometers and in effect they act as the trimming controls for the transceiver.

A small downward facing loud speaker is included, as is a 3.5 mm jack for the connection of an external speaker.

A good quality push-to-talk dynamic microphone, fitted with the now standard screw on four pin type connector is supplied as a standard feature. However it seems odd that the headphone jack on the front panel is a 3.5 mm type which does not match up with normal Japanese headphones which are all fitted with either two or three connection ¼ inch plugs. Adaptors can be purchased to mate the ¼ inch plugs with the 3.5 mm socket but one is not supplied with the transceiver.

The transmitter power output is rated at 12 watts PEP on SSB, 14 watts on FM and CW and 2.5 watts on AM. The reason for the seemingly low output on AM is that 2.5 watts of 100% modulated AM is of course 10 watts PEP.

Two band widths are available on receive. For SSB, CW and AM a 2.4 kHz filter with a two to one shape factor is provided. This of course makes the AM receive mode of only limited use and in general better copy of AM can be achieved in the SSB position. However this assumes that the AM in question is free of any FM or other frequency shift.

For FM a band pass of 17 kHz with a shape factor of just over two to one at the 60 dB points gives an excellent compromise for this mode.

THE FT221 ON THE AIR

Getting the FT-221 on the air is a very simple operation. As mentioned earlier no actual tuning up is needed. It is only necessary to select the desired mode, the 500 kHz segment in which to transmit, and then the frequency within that segment on the main tuning dial. Push the button on the microphone, and you are on the air.

It is necessary to recalibrate the main dial for each mode of operation due to the different bandpass filters used. With SSB, there is a 2.5 kHz shift between upper and lower sidebands although it would appear that for the present at least only upper sideband is used on two metres. Pressing the *"Calibrate"* button locks the dial scale but not the actual dial movement.

So the dial is set to the correct point, the button pressed in and the tuning knob rotated until zero beat is reached in the case of SSB or the discriminator meter reads zero or centre scale on FM. It is of course more important to be spot on frequency on FM due to the channel system used than it is on the so called tunable end of the band. After the appropriate calibration at any one hundred kHz point, the overall calibration remained within +/— .5 kHz throughout the range.

To operate through an FM repeater, the FT-221 provides a 600 kHz shift in either the transmit or receive frequency Repeater operation is only available on the 146.5 MHz range which of course covers all the local repeater frequencies, however it is a trap to try to work into repeater channel four by selecting the 147.0 MHz range. Reverse repeater operation is also possible, that is to listen on the input frequency and transmit on the output frequency by pushing the repeater switch up to "REV".

Repeater operation is indicated by a front panel warning light.

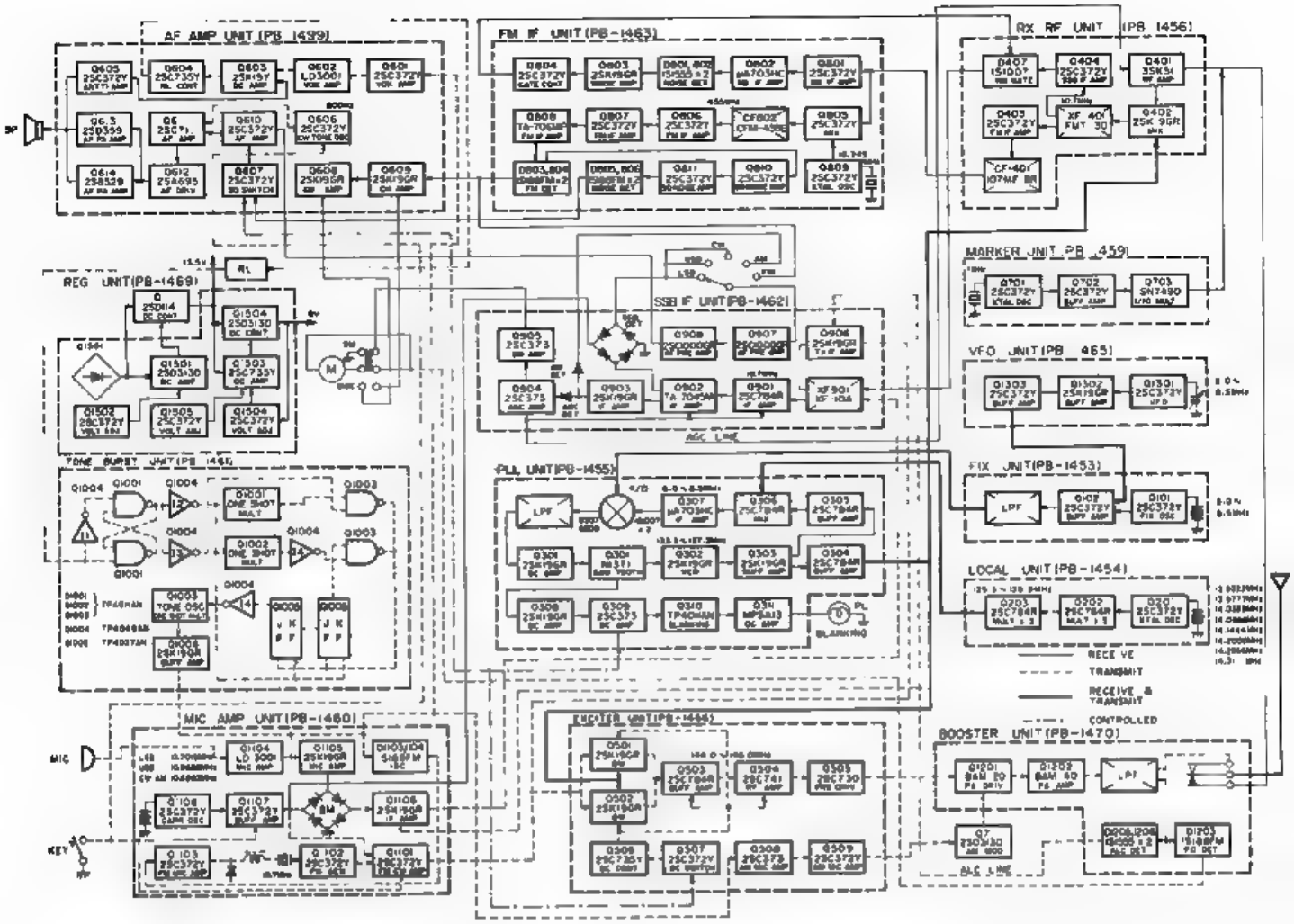
The "S" tuning meter proved to be rather disappointing. Yaesu seem to have over done their all black styling on the FT-221 and carried it to the face of the meter. To make matters worse, the illumination is provided by a single miniature globe set on the left hand side. If the set is used under conditions of poor external light then the meter is just not readable. It is hard to understand why Yaesu did not retain the meter used in the FT-220 or the currently available FT620B, both of which have clear rear illuminated meters.

While on the subject of illumination, the tuning dial must also come in for some criticism. The main kHz dial is reasonably good but the 100 kHz segment indicators set above this are again unreadable under conditions of poor external light.

The two speed tuning control was very smooth to operate with only a very minimal amount of back lash. Immediately behind the central pointer of the main tuning scale is a red LED which shines through the translucent kiloHertz scale. There does not appear to be any useful purpose served by this but it does add a touch of colour to an otherwise sombre appearance.

VOX operation proved to be rather tricky As received from the agents the VOX delay was far too short although the delay control was set for the longest possible delay After some playing with the relay control a suitable delay time was produced but the adjustment appeared critical The action of the VOX appeared to be similar to that of the FT-101 and certainly does not encourage use of this feature.

Frequency stability of the transceiver was impressive. Tests were made over lengthy periods of time and during extremes



FT-221 BLOCK DIAGRAM

of temperature but the total drift recorded was less than 1 kHz. Also the linearity of the calibration was, as mentioned earlier, first rate.

Transmitted audio quality while clean and free of any distortion was generally reported as lacking highs. This applied to both the FM and SSB modes. It is understood that the local agents are aware of this problem and that modifications have been made to many units. However it seems that more improvement is needed in this area.

Received audio quality was decidedly thin both on FM and SSB. At first the small internal speaker was blamed but the sound did not change to any extent with a large external speaker plugged in. Tests were made on the frequency response of the receiver audio system but it proved to be wide enough to give good audio.

Apart from those tests already mentioned, several other points were checked out. Firstly the receiver sensitivity was checked on FM.

Quieting; .5 uv 25 dB
1 uv 38 dB
Signal to noise ratio.
.5 uv 32 dB
1 uv 38 dB
Mute opens at .2 uv

These tests were carried out with the set tuned to 146.5 MHz. Next the SSB sensitivity was checked at 144.5 MHz.

Signal to noise ratio
.5 uv 26 dB
1 uv 36 dB

These are excellent figures on all counts.

The 'S' meter calibration was checked and found to indicate 'S' 9 with a receiver input of 35 uv. Its action however appeared to be "scotch" due no doubt to the relatively high signal to noise ratio at low signal levels. Also no doubt due to the absence of atmospheric noise on the two metre band.

Transmitter power output was next checked.

On FM output at 146.5 MHz was 15 watts. The same figure was obtained on CW.

This was just above the specified figure of 14 watts.

On SSB output was checked at 144.5 MHz.

PEP output was 16 watts, again a little above the specified output of 12 watts.

INSTRUCTION BOOK

The book supplied with the FT-221 is well written and illustrated insofar as it goes. As is usual these days no data is included on servicing procedure and no printed circuit layouts are supplied. However the section on operating the transceiver is very complete and covers some eighteen pages. This is followed by a full description of the circuit with photographs of each board. A large scale block diagram and a very clearly drawn circuit diagram is included.

The FT-221 used for testing in our review was supplied by Bail Electronic Services of 60 Shannon Street, Box Hill North, Victoria, 3129. Bails have a very complete service workshop and of course carry a full range of spares for the FT-221 as well as being up-to-date with all the latest factory supplied data.

CONCLUSIONS

For the amateur who wants all mode full coverage of the two metre band, the FT-221 represents an excellent investment. Although the price might at first seem high, when the price of individual units that incorporate all the facilities of the FT-221 are added, the total would be well in excess of the price of this transceiver.

Information on price and delivery of the FT-221 should be directed to Bail Electronic Services. ■

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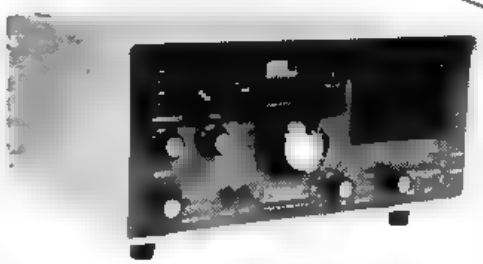

- Electronic Band Changing
- 0.5 — 29.9 MHz Continuous Coverage.
- Uses Wadley Loop (drift cancellation circuit) to derive synthesized heterodyne oscillator signal
- LSB USB AM and CW
- Frequency Readout better than 10 KHz (readable to 5 KHz)
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  Better than 2 μV for 10 dB S + N/N AM.
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  80-75 Ohm 1.6 —29.9 MHz
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NEWCOMERS NOTEBOOK

Rodney Champness, VK3UG
David Down, VK5HP

AN 80 METRE NOVICE RECEIVER — PART 2

This receiver is relatively simple although at first the circuit may appear complicated for a "simple" receiver. The description over the next few issues should dispel any qualms you may have about its operation.

The receiver is composed of 5 stages, not including the voltage regulator. The converter and local oscillator will be one article, the regenerative IF amplifier and detector another, and the audio stages another. The converter, V4, amplifies the incoming signals after which they are mixed with a signal 455 kHz higher in frequency, generated by the triode section of V4. The conversion or mixing process produces several frequencies. One of them is 455 kHz, which is passed on to the regenerative IF stage centred about V5, where the signals are amplified and converted to audio. This is further amplified by the two audio stages in V6, and fed to the loudspeaker.

THE FREQUENCY CONVERTER

The frequency converter is the section of the receiver built around V4. Its purpose is to convert the incoming signal on 3.5 to 3.85 MHz — the tuning range of the receiver — to a fixed frequency of 455 kHz, the *intermediate frequency*.

The signal received on the aerial is fed down the coaxial cable from STR2/3 to the aerial low impedance coupling coil L11. This induces voltages in the secondary winding L10 of the RF transformer in proportion to the strength of the incoming signal irrespective of frequency, or almost so.

L11 is what is called *aperiodic*, which means that theoretically it responds equally to all frequencies. However, L10 is tuned, and therefore will favour some frequencies more than others. The tuning of L10 is accomplished by C50, C51, C52 and C53.

The signal is then applied to the signal grid of V4 and mixed with the local oscillator signal generated in the local oscillator (triode) section of this same valve. We will return to the mixing process after the local oscillator has been described.

THE LOCAL OSCILLATOR

The local oscillator section of V4 consists of the elements connected to pins 3, 7 and 8. The oscillator is a tuned grid type with a plate feedback winding, and functions as follows. Plate voltage is applied via R58 and L13. As current begins to flow in the valve the winding L13 induces voltage in L12 such that the top of L12 goes positive and C56 which is uncharged and remains so for a while, transfers this positive voltage to pin 7, the grid.

With the grid now positive the plate will draw more current. This higher current being drawn across L13 causes a higher voltage to be induced across L12 and passed onto the grid. This action continues until the valve has reached plate current saturation — the plate is collecting all the electrons emitted from the oscillator section of the cathode, or the voltage drop across C56 becomes too great due to the low impedance offered by the grid conduction of the oscillator triode, or a combination of both.

When plate saturation occurs there will be no increasing magnetic field across L13 coupled to L12. No magnetic lines of force will be cutting L12 so no voltage will be induced in it. Positive voltage will not be evident at the top of L12, so C56 will not be trying to put positive voltage on the grid.

In fact C56 has been charging via the grid-cathode diode and now places a negative voltage on the grid. This reduces the plate current, which means that the magnetic field about L13 is collapsing. The lines of force cutting through L12 are now in the opposite direction so that the top of L12 becomes negative in relation to earth. This is a cumulative effect and continues until the triode is fully cut-off. The negative voltage on the grid will continue to increase and the positive voltage on the plate will rise above supply voltage due to the combined inductive properties of L12 and L13 and the stored energy in their magnetic fields.

Having cut off the triode momentarily, the tuned circuit L12 with C57, C58, C59 and C60 is in a state such that the capacitors are charged negatively with respect to earth. The capacitors begin to discharge through L12 and, by mutual inductance, L13 is actuated to produce a still higher than normal voltage on the plate. The valve is still cut off due to the high negative bias on its grid. This bias is rapidly reducng as the voltage at the top of L12 approaches zero, and as it gets below the value of the valve cut-off, plate current is again drawn. This means that L13 will again start to build up its own magnetic field. The tuned circuit with L12 as its inductor is still in control and continues to cause more plate current to be drawn until the grid of the triode goes positive in relation to the cathode. The magnetic field around L13 coupled to L12 is expanding causing L12 to go positive at its top again. This is a regenerative effect and continues until plate saturation and high peak grid current occur in the triode.

We are now back at square one, having taken the local oscillator through a little over one complete cycle. The frequency of the oscillation is controlled by the tuned circuit L12, etc. C56 couples the oscillatory energy to the grid, R57 is the grid leak which sets the oscillator standing bias. The amplitude of the oscillations is self regulating, the bias voltage across R57 varies with the loading of the oscillator, supply voltage and the amount of positive feedback. C56 charges to this stabilised bias voltage and only the variations of RF voltages developed across the tuned circuit are passed to the valve grid

The local oscillator triode is unaffected by the voltage to earth from the cathode of V4 as the triode is connected with a resistor direct from grid to cathode. For stable operation of the oscillator it is desirable to have the plate voltage regulated and for it to run continuously whether you are receiving or transmitting. The oscillator is then running at a more constant temperature and will tend to drift less. No particular effort has been made in this receiver to compensate the local oscillator against frequency drift, although it is desirable to keep hot resistors away from the tuned circuit and the capacitors. Coil leads and capacitor leads should be as rigid as possible so that the receiver does not jump around in frequency if moved or bumped on the operating table. The coil itself, and in particular the tuning gang, should be solidly mounted. A solid mounting for the 36:1 reduction tuning dial is also necessary to ensure minimum *backlash*. *Backlash* is the effect observed in some tuning systems such that the position on the dial where a station is tuned varies depending on whether you tune from a higher or lower frequency to the desired station.

THE CONVERSION PROCESS

Having described how the oscillator and signal input circuits operate it is now time to look at how the conversion process from signal frequency to the 455 kHz intermediate frequency is achieved. Perhaps a definition of *intermediate frequency* is desirable at this point. Intermediate frequency in superheterodyne reception is a frequency resulting from the combination of the received signal and the local oscillator frequency. It possibly received its name from the fact that its frequency was usually lower than the received signal frequency but higher than audio frequency, therefore intermediate between input signal and audio output.

The conversion or mixing process will occur in any non-linear circuit. V4 and its circuitry are arranged so that this non-linear performance is obtained under normal conditions. It will be noted that the oscillator section of V4 has its grid extended into the electron stream of the heptode section Remembering that this grid goes negative and cuts off the triode section, it is not unreasonable to assume that it also cuts off the heptode section at the same time, which means that the signal grid, pin 2, has no control of the heptode section at this time. This type of converter acts like a gating valve with two controlling grids, either of which control the conduction of the heptode section. If for example pin 7 is trying to go positive at a particular instant and pin 2 is also going in a positive direction but still with negative bias on it, the plate current through pin 6 will tend to increase. With pin 7 still trying to go positive, that is with grid current flowing due to the oscillator operation, and the signal on pin 2 going in a negative direction the plate

current will tend to decrease. If pin 7 is well beyond negative cut-off a positive going voltage on pin 2 will tend to bring the heptode section into conduction sooner, whereas if it is going negative it will keep the heptode cut-off for longer.

CONVERSION AND MIXING PRODUCTS

The above is basically the process of mixing, and in this process a number of new frequencies are produced. When the signal frequency (Fs) and oscillator frequency (Fo) are present in this common electron stream, where the stage is non-linear due to the oscillator function, the two frequencies will add to and subtract from each other at a rate which is dependent on their relative frequencies. For example if you strike two piano keys which are close together you will hear a third note, or more likely an increase and decrease in the level of the two notes that have been struck. The rate at which this occurs will be the difference in the frequency between the two notes. A similar action takes place in a radio receiver converter-mixer stage. In fact two additional frequencies are produced in the converter output, these being Fo-Fs, and Fo + Fs. These products are much lower in level than the original mixing elements Fo and Fs. In this receiver typical frequencies are Fo = 4000 kHz, Fs = 3545 kHz. Then Fo-Fs = 4000 kHz-3545 kHz = 455 kHz, and Fo + Fs = 4000 kHz + 3545 kHz = 7545 kHz. However, we are interested in only one of these frequencies, that is 455 kHz. L14 is tuned to 455 kHz and so accentuates this frequency and bypasses all other frequencies to earth.

If you have access to an oscilloscope and a couple of audio frequency signal generators, the effect of mixing two frequencies in a non-linear device can be seen on the screen. The odd wave forms displayed will be the products of the two mixing frequencies. The display will in fact have the 4 frequencies present, although they will be hard to pick in most instances.

The waveforms at the plate of V4 heptode will be similar in style to the AF patterns although naturally these will be at RF. The oscilloscope in itself should not be a non-linear device so a germanium diode placed across the input to the oscilloscope, and a resistor of about 1K ohm in series with the output of each generator should give the desired effect. The input to the network should be about 1 volt RMS. The mixing process is a difficult one to understand, and it is hoped this description is of some help when allied with other texts on the subject.

RF GAIN CONTROL

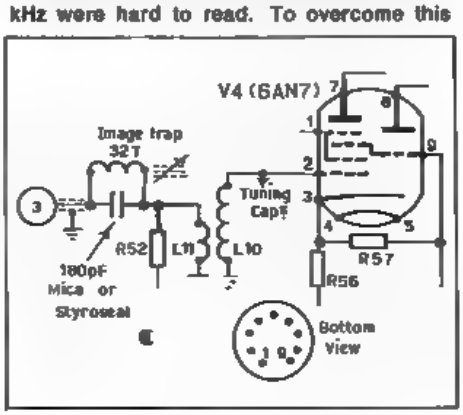
The gain of the heptode section is controlled by varying the bias on pin 2 relative to the cathode, and is taken care of by R53. V4 is a variable cut-off heptode and by increasing the negative bias the gain of the stage is decreased. The RF gain control R53 is able to control the gain of the heptode V4 over a range of 80 to 90 dB, which means that it is able to handle signals from below a microvolt to between 30 and 100 millivolts (S-9 + 60 dB on some S-meters). When the RF gain control is in the minimum gain position the low impedance aerial coil link L11 is also partly shorted to earth, which also reduces the receiver gain.

IMAGE RESPONSE

One of the criticisms of the receiver when it was first tried was that its image rejection was not very good. Theoretically L10 and its associated tuning capacitors should respond only to signals within a few kilohertz of the particular frequency to which the set is tuned. Unfortunately this tuned circuit has a lower "Q" than desired, and the response 910 kHz away is significant even though it is considerably reduced in level. The converter will produce the 455 kHz IF frequency if an input signal 455 kHz lower than the local oscillator is presented to the heptode signal grid — or if a signal 455 kHz higher than the oscillator is presented to the signal grid. For example suppose that you are tuned to 3590 kHz (FS) and the oscillator is tuned to 4045 kHz (Fo). By subtraction this gives 455 kHz. Now consider an input of 4500 kHz (Fs)-4045 kHz (Fo) = 455 kHz. It can be seen that a signal at either 3590 kHz or 4500 kHz will produce an IF output on 455 kHz if mixed with a 4045 kHz local oscillator. 3590 kHz is the desired signal and the signal on 4500 kHz is called the *image signal, the second spot.* In this case the image is a signal 455 kHz above the local oscillator signal. Currently the accepted term for describing this phenomenon is *image response* or *the image* depending on the text. The older term *the second spot* was used to describe the fact that in a wide tuning range receiver it was not uncommon to tune a particular station twice when tuning across the band. The station would appear at two spots separated by twice the IF frequency. This is a nice little problem for you to work out for yourself.

The receiver, the subject of this article does not suffer with second spot. Why? The selectivity of the first tuned circuit in a receiver is not particularly good and to overcome the image problems which ensue most amateur receivers use a first IF much higher than 455 kHz.

I have used the example of 4500 kHz because VNG on this frequency at night with high power caused quite a response in the receiver. Stations on and near 3590 kHz were hard to read. To overcome this problem an image trap was fitted as shown in the diagram. This tuned circuit is designed to reject signals on and near 4500 kHz with little or no effect on signals within the 80 metre amateur band. The coil is wound on an old TV IF coil former ¼ inch diameter, and slug tuned. It has 32 close-wound turns of 26 B & S enamelled copper wire, positioned so that the slug can be withdrawn from the winding without coming out of the coil former. This means that the slug is able to swing the frequency of the tuned circuit the maximum amount possible. To set the circuit up for maximum attenuation wait until VNG is heard and then adjust the coil slug until VNG either disappears or is reduced to an insignificant level. In the prototype VNG disappeared completely with this modification.



Modified receiver input showing image trap

TUNING THE FRONT END

C57 in conjunction with C58 set the tuning range of the local oscillator. If a wider tuning range is required C57 could be increased in value. C59 sets approximately the band that will be tuned by the oscillator. The corresponding capacitors in the aerial circuit would also have to be tered to similar values to those used in the oscillator. It will be noted that the values of the capacitors and the coils are not identical. The aerial circuit is expected to track or follow the tuning of the local oscillator but be 455 kHz away *at all times.* It is suggested that C50 in the aerial tuning circuit have a trimmer placed across it so that this circuit can be made to track the oscillator circuit across the particular band being tuned.

If you have made the oscillator and aerial tuned circuits as shown in the parts list it should not be difficult to align this portion of the receiver. Hopefully you will have your transmitter operational and have a few crystals available for use within the 3.5 MHz amateur band. Plug a crystal into the transmitter and switch to net. A powerful CW signal should now be audible somewhere within the tuning range of the receiver. Adjust C53 for a peak in the level of this signal — it should come with the capacitor at about half travel.

If it does not and you run out of range either higher or lower capacity is required for C52. Try again with capacity about 20 pF greater or smaller in value. If the circuit now peaks nicely leave it as it is and then check that the tracking is okay. To check this replace C50 with a capacitor of about 15 pF less capacity than shown on the parts list and place a 3-30 pF trimmer across it. It should now be possible when tuning from one end of the band to the other to make the aerial circuit track with the oscillator circuit. C50-trimmer and C53 will inter-react a certain amount but by judicious adjustment the circuit can be aligned quite accurately. The exact tuning range of the oscillator can only be determined by feeding in signals of known frequency or by using a signal generator — a GDO is not usually well enough calibrated for this job. It may be found that the transmitter oscillator is too strong in the net position for the re-

ceiver, so by adjusting the value of R18 it is possible to drop the level to a useable strength. The value of this resistor was increased to 470k ohm in this particular transmitter. Where the transmitter and receiver are on separate chassis a lower value of resistor may be desirable.

It will be noticed in the diagram that V4 is shown as a 6AN7. The 6AN7 is a more readily available valve than the 12AH8. The valve pin numbering is read from underneath the valve socket. Next month the regenerative IF detector will be described, and in the meantime *David Down* continues this month with information on how to use the GDO. The coils in the Novice receiver were checked with the GDO.

THE GDO — WHAT WILL IT DO FOR ME?

Most operators asked to assemble a set of test bench equipment would perhaps leave the Grid Dip Oscillator until the end, when in fact it can be one of the handiest instruments for the do-it-yourselfer's shack.

With a GDO, we can:

1. Measure circuit resonance — filters, traps, antennas and their feeders, etc.
2. Use it as a relative field strength meter.
3. Use it as an oscillating detector for frequency measurement.
4. Use it as a signal generator.
5. Operate it as a local oscillator for receiver tests.

The GDO is really only a VFO with a meter to measure RF power. The meter is a microammeter and measures either grid or base current depending upon the particular GDO circuit.

One of its most common uses is for checking resonance. Even with the transmitter power off, the transmitter can be pre-tuned. All that is done is for the GDO to be set to the desired operating frequency, placed near the grid tank circuit, and the grid capacitor dipped. Repeat for the anode tank circuit, and the transmitter is pre-tuned. After applying power to the rig, a slight trimming may be required.

Coil winding creates more GDO opportunities, especially if you don't like tiresome calculations! Just wind a coil that looks about right, connect the required capacitor determined from your circuit and its parts list (if applicable), and check with the GDO. It will not take long for you to become a good judge of coil sizes, uses and capabilities.

With antennas, put a GDO next to yours, run up the desired frequency on the dial, and you will soon see if your antenna is worth keeping or not!

Spend some time getting to know the GDO — it can be a very valuable shack aid. If you know a nearby amateur who runs a GDO in his shack, ask politely if you can be taught about its operation.

Take this article with you — he may not be a member of the WIA. ■

COMMERCIAL KINKS

Ron Fisher, VK3OM
3 Fairview Ave.,
Glen Waverley, 3150

Reference to the Realistic DX 160 receiver in the column a few months ago brought a quick response from Keith Ayton VK3YHC. Keith has made a few modifications to his DX 160 that are well worth passing on. He claims that he is now getting improved gain on 15 and 10 metres and at the same time a reduction in cross modulation from local stations.

1. The two RF amplifier FET's have been replaced with a single MPF 121 dual gate MOS FET. This was installed under the printed circuit board. The source, gate 1, and drain connections drop straight into place, but the gate 2 lead needs to be extended about ⅛ inch with a piece of tinned copper wire.

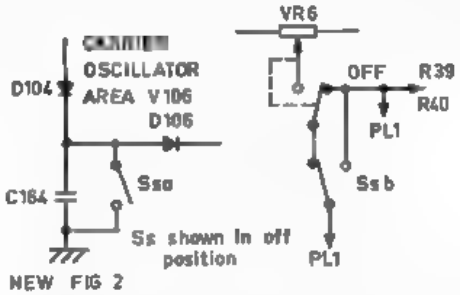
2. The RF attenuator has been taken out of circuit and a short piece of small diameter coax cable has been run directly from the printed circuit board to an SO239 Amphenol coax socket installed on the rear apron of the receiver.

Keith claims that with the RF attenuator removed the input impedance of the receiver remains close to 75 ohms and he feeds it directly from a G5RV antenna without the need for an antenna tuning unit.

CW NETTING ON THE FT200

John Adcock VK3ACA has had further thoughts on his earlier method described last year. John says: *"I personally think the method works so well that every transceiver should have one"*. Well here it is for your own decision.

"In November 1975 Commercial Kinks a modification to the FT200 was described to allow netting of the transmitted signal to the received signal when using CW. The method consisted of shifting the carrier oscillator on *'receive'* the same amount as on *'transmit/CW'*. In order to net, it was necessary to switch S2 Fig 2 on, and zero beat the incoming signal with the clarifier off. It was then necessary to adjust the clarifier to give the desired beat note. This required two switching operations for each netting.



NEW FIG 2

In practice this arrangement was found to be clumsy. A better set up is shown in the new Fig 2. The switch S2 was replaced by a DPDT switch. Ss-a is used to shift the frequency of the carrier crystal on *'receive'* as before. The second half of the switch Ss-b is used to bridge out the clarifier switch.

As before the new switch is placed in the top right hand corner of the front panel. This is close to the clarifier switch and it is a comparatively simple matter to extend the wiring. The actual switch used was an NKK type S2022.

The procedure when using the switch is as follows. Turn the switch on and tune in the CW signal with the main tuning knob until zero beat. Turn the switch off and adjust the clarifier to give the desired beat note.

On all subsequent occasions after using the switch to net, the beat note will return to its preset condition.

You will find that this simple modification takes the uncertainty out of knowing whether you are netted or not. Do not be surprised if the other person does not come back on your frequency because most transceivers have no means of zero beating on CW". ■

INTRUDER WATCH

Alf Chandler, VK3LC
1538 High Street, Glen Iris, 3146

A pattern of Red Chinese thinking has emerged over the past twelve months or so insofar as Commercial or Military point to point communication is concerned, and it is the phenomenon of the same stations changing call signs and frequencies from time to time.

From February until April 1975 on 14031 kHz, MOEX was calling DUQT using a continuous repeating call tape from April until June '75 QEBL was calling CBFN on 14039 kHz, from June until August '75 it was DNOQ calling OLNC on 14126 kHz; from September until January '76 on 14109 kHz ZCPU was calling YMBK; from February until April '76 XSQU has been calling SUDV on 14155 kHz and now starting on the 16th April on 14239 kHz GCQF is calling TURX. We know these stations are Red Chinese because of the procedure used, and the bearings are always identical. The speed of their continuous tape is about 10 wpm, and the procedure — "v (once) TURX (thrice) de GCQF twice)" repeated ad infinitum, but sometimes breaking off into four letter code at about 25 wpm. I wonder whom they think they are fooling?

I am appealing for Observers with RTTY facilities to come forward because the two major successes that we have achieved in Australia have been through read-outs of Commercial RTTY signals sent to me by such an observer. About two years ago I was given read-outs of a signal heard in the 14 MHz band. It was in plain language (English) transmitting British Embassy traffic and the station was TCX located in Ankara Turkey. After sending copies of these read-outs to my colleague in England and he passing them on to his Administration, TCX disappeared out of our band. Again a month or so after I was given read-outs of a station KJG in the same band, and the similar procedure was adopted. The language was foreign, but was subsequently translated as Croat-Serbian and the station was located in Yugo-Slavia. The complaint to the Yugo-Slav Administration produced an apology and the signal disappeared out of our band. Neither of these stations had been identified by Region 2 nor by Region 1 and it was to the credit of Region 3 that action was taken.

The moral of this is obvious. I have not been given any read-outs for some considerable time now, and there are many F1 tele-type signals operating in our bands. I know that many commercials are too fast for Amateur equipment, but there must be some that can be copied. How about it boys? ■

A few words from "IZNIBS"

IC 502
I would like to correct an error shown in our recent advertising for this model and as you have probably already worked out, an IC-502 does not cover 52-54 MHz, but only 52-53 MHz. Whilst on this subject, it is interesting to note that in USA the FCC have been rather upset by some spurious signals and harmonics from transceivers which may affect other users, especially in the 420-450 MHz band. This was referred to in a recent issue of HamRadio Magazine. We know from conversation with Mr. Inoue that his Company is concerned about the potential problem of "out of band" signals and he goes to very long lengths to ensure that all the ICOM equipment will meet the Regulations in various countries including the USA, and in fact models destined for the USA have a label affixed indicating that they do meet FCC specifications. We have not heard of any such move within Australia for the Authorities to be concerned to the same extent, although I am quite sure that a detectable signal capable of causing interference would be soon pointed out. Maybe there is some room for some specification to be laid down in this area. I can assure you, however, that the equipment we sell is well within the tolerances allowed.

OUR GUARANTEE:
The equipment we sell carries either a twelve-month guarantee against faulty workmanship or components (in the case of ICOM) and thirty days in the case of Atlas or Uniden. This covers both parts and labour, with the exception of valves and semi-conductors and only if the equipment has not been tampered with or abused.
A word or two of explanation is required about valves and semi-conductors, and I am sure that you appreciate a moment's carelessness could cause P.A. bottle to fail by operating into a high SWR and it would quickly wither and die if full power is held on for more than a few seconds. If properly used tubes will last two years or more, if improperly used they will only last a few milli-seconds. This is why we cannot under any circumstances guarantee tubes.
Similarly, a sniff of RF around a FET and bang goes the FET! Here again, with sensible use, semi-conductors last for years but if mistreated they quickly give up the ghost. This is the reason why we cannot guarantee them. The only exception to this rule are the semi-conductors used in the Atlas, and the Factory is big hearted enough to extend a twelve-month warranty on a "once off" basis.
There have however, been exceptions when we have replaced tubes and semi-conductors under guarantee when we felt that there has been reasonable doubt, but it is at our discretion. The same thing applies regarding tampering and fiddling around. No one wants to sort out some mess under guarantee if someone decides that he knows more than the designer and makes a modification. I personally feel like wrapping the entire rig around his ears but we try to keep our tempers and point out that we cannot repair the damage under warranty but for a small charge, will make it right.
Having thus painted a pretty bleak picture how we avoid helping you in any way, let me hasten to add that if you are reasonable and have a fair demand for service under guarantee, you will find that we give the best in the country!

73 PETER 31Z
General Manager
VICOM International Pty Limited

RULES FOR VK/ZL/OCEANIA JUBILEE DX CONTEST 1976

NZART and WIA, the national Amateur Radio Associations in New Zealand and Australia, invite worldwide participation in this year's VK/ZL/OCEANIA DX CONTEST

OBJECTS:
For the world to contact VK/ZL/Oceania Stations and vice versa, as part of NZART Jubilee Celebrations.

WHEN?
Phone: 24 hours from 1000 GMT Saturday, October 2 to 1000 GMT Sunday, October 3.
CW: 24 hours from 1000 GMT Saturday, October 9 to 1000 GMT Sunday October 10.

RULES:
1. There shall be three main sections to the contest —
   a. Transmitting phone.
   b. Transmitting CW
   c. Receiving — "Phone and CW" combined.

2. The contest is open to all licensed transmitting stations in any part of the world. No prior entry need be made. Mobile Marine and other non-land based stations are permitted to enter. Their 'country status' will be determined by the country which issued the call sign used in the contest.

3. All amateur frequency bands may be used but no crossband operation is permitted. **Note:** VK and ZL stations irrespective of their location do not contact each other for contest purposes except on 80 and 160 metres on which bands contacts between VK and ZL stations are encouraged.

4. Phone will be used during the first weekend and CW during the second weekend. Stations entering both sections must submit separate logs.

5. Only one contact on CW and one contact on Phone per band is permitted with any one station for scoring purposes.

6. Only one licensed amateur is permitted to operate any one station under the owner's call sign. Should two or more operate any particular station, each will be considered a competitor and must submit a separate log under his own call sign. This is not applicable to overseas' competitors operating Club Stations.

7. Entrants must operate within the terms of their licences.

8. **Cyphers:** Before points can be claimed for a contact, serial numbers must be exchanged and acknowledged. The serial number of five or six figures will be made up of the RS (Phone) or RST (CW) report plus three figures which may begin with any number between 001 and 100 for the first contact and which will increase in value by one for each successive contact, e.g. — If the number chosen for the first contact is 021 then the second must be 022 followed by 023, 024 etc. After reaching 999, restart from 001.

9. **Scoring:** (a) **For Oceania Stations other than VK/ZL** — 2 points for each contact on a specific band with VK/ZL stations, and 1 point for each contact on a specific band with the rest of the world.

(b) **For the Rest of the World other than VK/ZL** — 2 points for each contact on a specific band with VK/ZL stations, and 1 point for each contact on a specific band with Oceania Stations other than VK/ZL.

(c) **For VK/ZL Stations** — 5 points for each contact on a specific band and in addition, for each new country worked on that band, bonus points on the following scale will be added — 1st contact, 50 points; 2nd contact, 40 points, 3rd contact, 30 points; 4th contact, 20 points, 5th contact, 10 points.

Note (1) The ARRL countries list will be used except that each **call area** of "W/K", "JA", "UA" will count as 'countries" for scoring purposes as indicated above.

Note: (2) Call areas include different prefixes — e.g. W1, K1 WA1, WN1 are all the **same** call area, just as are UA9, UK9, UV9, UW9 in same call area; or UB5, UK5, UT5, UY5 in same call area and **these are not different call areas. Check this carefully** — use Call Book!

(d) **80 Metre Section** — For 80 metre contacts between VK and ZL stations, each VK/ZL call area will be considered a "scoring area" with contact points and bonus points to be counted as for DX contacts. **N.B. Contacts between VK and ZL on 80 only.**

(e) **160 Metre Segment:** For 160 metres, contacts between VK/ZL, VK/VK, ZL/ZL and ZL/VK to the rest of the world. Each VK/ZL call area will be considered a "scoring area" with contact points and bonus points to be counted as for DX contacts (Rule 9(c)). **Note:** A contestant in a call area may claim points for contacts in the same call area for this 160 metre segment.

10. **Logs:**

(A) Overseas Stations: (a) Logs to show in this order — date, time in GMT, call sign of station contacted, band, serial number sent, serial number received, points claimed. **Underline** each new VK/ZL call area contacted. Separate log must be submitted for each band used.

(b) **Summary Sheet** to show call sign, name and address in **block letters;** details of station; and, for **each band** — QSO points for that band; VK/ZL call areas worked on that band. "All band" score will be total QSO points multiplied by sum of VK/ZL call areas on all bands while "single band" scores will be that band QSO points multiplied by VK/ZL call areas worked on that band.

(B) VK/ZL Stations: (a) Logs must show in this order — date, time in GMT, call sign of station worked, band, serial number sent, serial number received, contact points, bonus points. **Use separate log for each band.**

(b) **Summary Sheet** to show — name and address in **block letters,** call sign, score for each band by adding contact and bonus points for that band, and "all band" score by adding the band scores together; details of station and power used; declaration that all rules and regulations have been observed.

11. The right is reserved to disqualify any entrant who, during the contest, has not strictly observed regulations or who has consistently departed from the accepted code of operating ethics.

12. The ruling of the Executive Council NZART will be final.

13. **Awards — World-wide — except VK/ZL.**

(a) Attractive multi-colour certificates to the top scorers in each country. (Call area in "W", "JA", "UA"). Separate Awards for phone and for CW.

(b) Depending on reasonable degree of activity, separate certificates may be awarded for top scores on different bands.

(c) Where many logs are received, consideration will be given to awarding 2nd and 3rd place certificates.

(d) NZART Jubilee Plaque to top scorer in each Continent (both on phone and on CW)

(e) **Jubilee Participation Certificate** to every contestant forwarding a log. These will be posted direct if IRC enclosed, otherwise sent via Bureau.

VK/ZL AWARDS
Attractive multi-colour certificates —
1. To the top three scorers in each call area of VK and of ZL.
2. To the top three scorers on individual bands (160, 80, 40, 20, 15, 10) in VK and in ZL — separate awards for phone and for CW
3. NZART Jubilee Plaques to top scoring VK both in phone and in CW sections.
4. NZART Jubilee Plaques to ZL contestants as per separate list.
5. Jubilee Participation Certificates to all VK/ZL entrants as per 13a above.

14. **Entries from VK/ZL Stations** should be posted direct to —

NZART Contest Manager ZL2GX,
152 Lytton Road, Gisborne, New Zealand — to arrive not later than December 31, 1976.
From **Overseas' Stations** — to the above address or NZART, Box 489, Wellington, New Zealand — to arrive not later than January 31, 1977.

SWL SECTION:
1. The rules are similar to the transmitting section but it is open to all members of any SWL Society in the world. No transmitting station is permitted to enter this section.
2. The contest times and logging of stations on each band per weekend are as for the transmitting section except that the same station may be logged twice on any one band — **once on phone and once on CW.**
3. To count for points, the station heard must be in QSO exchanging cyphers in the VK/ZL/Oceania DX Contest and the following details noted — date, time in GMT call of the station heard; call of the station he is working, RS(T) of the station heard, serial number sent by the station heard, band, points claimed.
4. Scoring is on the same basis as for the transmitting section and a summary sheet should be similarly set out.
5. Overseas Stations may log ONLY VK/ZL stations but VK receiving stations may log overseas stations and ZL stations, while ZL receiving stations may log overseas stations and VK stations.
6. Certificates will be awarded as listed in the section under "Awards"

Jock White ZL2GX,
Contest and Awards Manager, NZART. ■

CONTESTS

Kevin Phillips, VK3AUQ
Box 67, East Melbourne, 3002

CONTEST CALENDAR

June
- 5/13 Townsville Pacific Festival Contest
- 12/13 RSGB National Field Day
- 12/14 Midwinter Field Day (VHF)
- 19/20 All Asian Phone Contest
- 26/27 ARRL Field Day

July
- 3/4 Venezuelan Phone Contest
- 17/19 County Hunters CW Contest
- 24/25 ARRL Bi-centennial
- 31/Aug. 1 Venezuelan CW Contest

August
- 14/15 **Remembrance Day Contest**
- 14/15 European CW
- 21/22 All Asian CW Contest

REMEMBRANCE DAY CONTEST 1976
This contest will be held on the 14th and 15th of August. It is the second contest to count towards the Contest Champions Trophy for 1976. Rules will be in next month's AR. I hope everyone will get their gear in good order and enter the contest and have a good time. I hope to be reasonably active myself, so see you on air.

RSGB NATIONAL FIELD DAY
Starts 1700 GMT June 12. Ends 1700 June 13.

Stations outside Great Britain are not eligible to enter on a competitive basis, but you can work the British portables and submit your check log. A certificate will be issued to the VK station who has the greatest number of contacts with British portables.

Send logs to

RSGB HF Contests Committee,
C/o A. Davis,
41 Gainsborough Road, Crawley,
Sussex RH10-5LD, England.

ALL ASIAN DX CONTEST
Phone June 19-20. CW August 21-22
Exchange For OM's, RS(T) plus age of operator. For YL's, RS(T) plus OO. Scoring is one point per QSO. Non Asians use prefixes of Asian countries worked for their multiplier. Final score: Total QSOs from each band times the sum of the multiplier on each band.

Awards go to the highest scorers, phone and CW, all bands in each country up to the 5th rank where returns justify. Single band and multi op each country only.

Logs should have all times in GMT, fill in prefix column only first time it is worked, and use a separate sheet for each band. A summary sheet showing scoring and other information, and a signed declaration, are also requested.

Logs must be received no later than September

30th for phone entries and November 30th for CW. Logs go to JARL Contest committee, P.O. Box 377, Tokyo, Central Japan. Include an IRC and SAE for copy of results.

VENEZUELAN CONTEST

Phone July 3, 4. CW: July 31-August 1
Starts 0000 GMT Saturday. Ends 2400 GMT Sunday.

All bands 80 to 10 used. Exchange RS(T) report plus a 3 figure QSO number starting with 001. Claim 2 points per contact with stations in other countries.

Multiplier One for each country and each YV call area contacted on each band. Final score is total QSO points multiplied by sum of different countries and YV call areas worked on each band.

A remittance of $2.00 US is requested, or its equivalent in IRCs for each certificate application. Mailing deadlines are September 15th for phone and October 15th for CW. Send logs to Radio Club Venezolano, P.O. Box 2285, Caracas 101, Venezuela.

[illegible] BI-CENTENNIAL CELEBRATION

From 0000 UTC July 24th to 2359 25th July. Try to work as many stations within the 50 United States only. Single op and Multi op permitted. Multi transmitter prohibited. Non US participants send signal report and consecutive report starting at 001. Final score is total number of contacts. No multipliers.

Entries must be postmarked no later than 1st September.

SOME COMMENTS ON THE NATIONAL FIELD DAY

VK4WIM/4 had a great time. VK3JL/3 wishes CW stations would sign as /3 not as /P. 2JM/2 says the day was very hot and reception conditions bad. 7HE/7 operated from a paddock 25 miles NNW of Launceston with equipment consisting of FT201, 18AVT ground mounted, tent, card table, chair, and barbecue. 3XU ran 500 milliwatts solid state. 3ALZ/3 Doctors Creek was disappointed at the lack of home station activity. 3TX/3 found more phone stations were prepared to have a go at CW for the extra points.

VK5DL/5 writes — At one stage I heard a rather badly sent CQ, and found it to be a cricket outside my tent. 4XZ/4 says it rained, as usual. What about having the contest in October or November. VK2CAX/2 says moths tend to come to a spectacular end by flying into my ATU on transmit. I myself went to the Christmas Hills with many beds, much gear and a 15 KVA alternator to run rigs and heaters etc. I hope all who entered enjoyed the contest and will participate next year. ■

WHERE, AND HOW MUCH?

Vic Pleuger, VK3AVP

The intention of this column will be to present information to the amateur and electronics experimenter on how, where, and for how much you can obtain components, kits, or equipment, with particular emphasis on hard to get or good value items.

Readers' assistance in the compiling of this column would be greatly appreciated. If you have relevant details on new or alternative sources of materials, according to the given outlines, I would be pleased to hear from you.

It should perhaps be pointed out that the information to be presented cannot hope to cover the whole electronics field. However, this column will always endeavour to remain unbiased with respect to non-advertisers and advertisers in this magazine.

INSULATING MATERIALS AND PRINTED CIRCUIT BOARD

Teflon sheet and polycarbonate insulating material is available from Dotmar Products P/L, 266 Blackburn Rd., Mt. Waverley, Vic. Tel. 232 9960, 233 3137. Fibre and mica washers, teflon rod and sheet, polystyrene rod and plastic sleeving is available from E. C. Menzies Electrical P/L, 566 Elizabeth St. Melbourne, Tel. 347 6844.

COMPONENTS

Concentric ceramic insulation trimmer capacitors, capacitance value 2-25 pf, solder-in lug type, that appear to be heavy duty and ideal for transmitter projects are available at a cost of 25 cents each from Ham Radio Supplies, 390 Bridge Rd., Richmond, Vic., 3121, Tel. 42 5174.

UHF feed-thru capacitors and chip type capacitors can be obtained from Tri Components P/L, 38 Avonshurst Dve., Glen Waverley, Vic., Tel. 560 2112.

Enamelled and other winding wire, in 2 kg rolls at a cost of approximately $7.50 each are available from O. H. O'Brien P/L, 94 Moray St., South Melbourne, Tel. 69 5781.

Double Balanced Mixers (Wideband) in DIL package to cover 1-500 MHz in two versions coping with input levels to +7 dbm or +17 dbm. Cost $13.70 each. Range available to cover the spectrum of 3 kHz-1.25 GHz. Wideband RF Transformers (Low Level) in DIL package (i.e. Mini DIP-8 pin) to cover frequency range of 15 kHz-600 MHz. Types available feature 50 ohm input to secondary impedances of 50, 100, 200, 450 and 900 ohms. The 200 ohm unit is centre tapped and is particularly useful for balanced modulators and mixers, and covers the frequency range of 0.2-350 MHz. Cost is approximately $4 each. The above are manufactured by Micro Electronics (USA) and are available from Deneve Controls P/L, 19 Lincoln Drive, Cheltenham, Vic., Tel. 93 9140.

Wideband RF power transformers for impedance matching in solid state high power amplifiers to cover the frequency range of 1.8-30 MHz at a rated input of 150 watts maximum, with turns ratios of 1:3, 4, 5 or 6 being available.

RF 1000, 150 watts, ea. $4.00 (Aust.) plus postage.
RF 800, 100 watts, ea. $3.20 (Aust.) plus postage.
RF 500, 50 watts, ea. $2.80 (Aust.) plus postage.
RF 400, 25 watts, ea. $2.00 (Aust.) plus postage.

These transformers are available from Communications Power Inc., 2407 Charleston Road, Mountain View, California, 94043, USA. ■

LARA

Ladies Amateur Radio Association

Consequent upon the relaxation of the ban on Amateur Radio examinations, the February AOCP and March Novice examinations were held, with many women sitting for them around Australia. These included LARA members Irene YF/VK3YER, Kate Duncan, Mavis YF/VK3BER, from Melbourne, and Su Challinor from Adelaide. These girls are now patiently waiting for their results.

In Adelaide five of the twenty-five students at the AOCP class, held at the Panorama Technical School this year, are ladies, namely Maxine McEnvoy, Rhondda Holker, Margaret Stallard, Jenny Warrington, and Su Challinor. Betsy Ashton and Hillary Adlam are also attending Novice classes.

It is anticipated that LARA will commence a correspondence course in Novice radio theory for women in the near future. It would therefore be appreciated if those interested in such a course could contact LARA.

The LARA skeds are still being held around the country. The 80 metre net, now back to its original time of 10.00 GMT on Monday evenings — 3650 kHz — is always well attended. Net controller is Myrna VK5YW from Adelaide. Other regular stations appearing are Mavis VK3KS, Anne VK7LY, Heather VK2HD, Mavis YF/VK3BER, Norma VK3AYL, Austine VK3YL, Lorraine VK5LM, Denise VK5YL, Rhonda VK3ZYL (YF/VK3ZYL), Joy YF/VK3BLR, Lorraine YF/VK6BV, Heather YF/VK3FF. On several of the nets all licensed South Australian girls (Myrna, Lorraine, and Denise) have taken part.

In Melbourne the VHF net is held at 8.30 p.m. local time on Tuesday evenings. Control station is Rhonda VK3ZYL, with call-in on Channel 1 VK3RML Repeater. But, provided enough stations have tunable equipment, the group then moves down the band for a natter. Regular meetings are also being held in Melbourne, the dates being the last Saturday of each month. Venues are usually the homes of members.

The LARA newsletter is now being published on a regular basis. Any interested people (YL or OM) who would like to be added to the mailing list should contact a member of LARA. The newsletter includes many interesting articles and will be the main method for communication between members.

For more information about LARA send your enquiries or comments to LARA, C/o 412 Brunswick St., Fitzroy, Vic. 3052. All letters are welcome. Otherwise join in on one of our skeds.

Norma VK3AYL. ■

AWARDS COLUMN

Brian Austin, VK5CA

PREFIX CROSS REFERENCES

AC1 — see A5	VK9AA-MZ — see P2
AP — see S2-3	VP2K — see VP2E
AX — see VK	VP3 — see 8R
CN9 — see CN2, 8	VP4 — see 9Y4
CR5 — see CR3	VP5 — see ZF1
CR7 — see C9	VP5 — see 6Y5
CR10 — see CR8	VP6 — see 8P
DX — see DU	VP7 — see C6
EA0 — see 3C	VQ1 — see 5H1
FA — see 7X	VQ2 — see 9J2
FB8 — see FH8	VQ3 — see 5H3
FB8 — see FR7	VQ4 — see 5Z4
FB8 — see 5R8	VQ5 — see 5X5
FD — see 5V	VQ6 — see 3B6, 7, 8, 9
FE8 — see TJ	
FF4 — see TU	VR2 — see 3D2
FF7 — see 5T	VR5 — see A3
FF8 — see TY	VS1 — see 9M2
FF8 — see TZ	VS1 — see 9V1
FF8 — see XT	VS2 — see 9M2
FF8 — see 5U7	VS9 — see 70
FF8 — see 6W8	VS90 — see A4
FQ8 — see TL	XF — see XE
FQ8 — see TN	YN0 — see YN
FQ8 — see TR	YT — see YU
FQ8 — see TT	YZ — see YU
FU8 — see YJ	ZB1 — see 9H1
HE — see HB0	ZD1 — see 9L1
HG — see HA	ZD2 — see 5N2
HT — see YN	ZD3 — see C5
IM — see IS	ZD4 — see 9G1
JR6 — see KR6, 8	ZD5 — see 3D6
KA6 — see KR6, 8	ZD6 — see 7Q7
KG1 — see OX	ZM6 — see 5W1
KG61 — see JD, KA1	ZS7 — see 3D6
LA/G — see 3Y, [illegible]	ZS8 — see 7P8
	ZS9 — see A2
LA/P — see JX, JW	3W8 — see XV5
MP4B — see A9	3Z — see SP
MP4D — see A6	4A — see XE
MP4M — see A4	4M — see YV
MP4Q — see A7	6D — see XE
MP4T — see A6	6D4 — see XF4
OF — see OH	7G — see 3X
OQ5, 0 — see 9Q5	8F — see YB
PK — see YB	8Z5 — see 9K3
PX1 — see C3	9E, 9F — see ET3
VK9 — see C2	9M4 — see 9V1

THE CYPRUS AWARD

The Cyprus Award Certificate has been sponsored by the Cyprus Amateur Radio Society. It will be awarded to any licensed amateur radio operator outside Cyprus who makes a specified number of two-way contacts with licensed amateurs on the Island of Cyprus. The conditions for its award are set out below.

To reduce as far as possible any advantage accruing to stations by reason of their geographical location, and to encourage activity on the less frequently used bands, the certificate will be awarded on a points basis determined by ZONE location and the frequency bands used. This is shown in the table below.

Amateur Bands Mc/s	1.8	3.5	7	14	21	28
Zone	Points scored per contact					
20	4	2	1	1	2	4
1,2,3,6,7,10,12, 19,24,25,26,27,28, 29,30,31 and 32	16	8	4	2	4	8
All other zones	8	4	2	1	2	4

The total number of points required to win the Award is dependent on the number of bands used.

If all contacts are made on ONLY ONE BAND — 32 points are required.

If the contacts are made on ANY TWO BANDS — 24 points are required.

If the contacts are made on ANY THREE BANDS — 16 points are required

If the contacts are made on ANY FOUR BANDS — 12 points are required.

Any mode of emission may be used, but operation must be in accordance with standard amateur service practice. Contacts to count must be made after 1st July 1962. Contacts with any one Cyprus station can only count once per band.

To claim the award, copies of log entries should be submitted under the following headings

DATE/TIME GMT
STATION WORKED
FREQUENCY BAND
SIGNAL REPORTS IN AND OUT

Each log sheet should be headed with the call sign, zone number and full postal address, preferably typed or printed in block capitals. These should be supported by the appropriate QSL cards or a certificate from the applicant's National Society certifying that the QSL cards have been produced to them. In countries without a National Society a similar certificate signed by two other amateurs will suffice. Log sheets, accompanied by ten IRCs (or equivalent), should be sent to

Awards Manager,
Cyprus Amateur Radio Society,
P.O. Box 1267, Limassol
Cyprus Republic

The log entries will be checked and at the discretion of the Cyprus Amateur Radio Society the certificate will be awarded. Unsuccessful applicants will be notified of the reason for rejecting their claim. ■

PROJECT AUSTRALIS

David Hull, VK3ZDH

JULY PREDICTIONS

Date	OSCAR 6 Orbit No.	Time Z	Long °W	Date	OSCAR 7 Orbit No.	Time	Long °W
1	16960	01 36	80.20	1	7433	00.08	51.34
2	16972	00 38	65.20	2	7446	01 00	64 96
3	16985	01 31	78.95	3	7459	01.54	78 58
4	16997	00 31	63.95	4	7471	00.53	63.46
5	17010	01 26	77 70	5	7484	01 48	77 08
6	17022	00 26	62.70	6	7496	00.47	61 96
7	17035	01 21	76 45	7	7509	01 41	75.58
8	17047	00 21	61 45	8	7521	00.41	60.46
9	17060	01 16	75 20	9	7534	01 35	74 08
10	17072	00 16	60 20	10	7546	00 34	58.96
11	17085	01 11	73.95	11	7559	01 28	72.58
12	17097	00 11	58 95	12	7571	00.28	57 46
13	17110	01 05	72 70	13	7584	01.22	71.08
14	17122	00.05	57 70	14	7596	00 21	55.96
15	17135	01 00	71.45	15	7609	01 16	69.58
16	17147	00.00	56.45	16	7621	00 15	54.46
17	17160	00.55	70.20	17	7634	01.09	68.08
18	17173	01 50	83 95	18	7646	00 09	52.96
19	17185	00 50	68 95	19	7659	01 03	66.58
20	17198	01 45	82 70	20	7671	00 02	51 46
21	17210	00 45	67 70	21	7684	00.56	65 08
22	17223	01 40	81 45	22	7697	01 51	78.70
23	17235	00 40	66 45	23	7709	00.50	63.58
24	17248	01 35	80 20	24	7722	01.44	77.20
25	17260	00.35	65 20	25	7734	00.44	62 08
26	17273	01 29	78 95	26	7747	01.38	75 70
27	17285	00 29	63 95	27	7759	00.37	60 58
28	17298	01 24	77 70	28	7772	01.32	74.20
29	17310	00 24	62.70	29	7784	00.31	59.06
30	17323	01 19	76 45	30	7797	01.25	72 70
31	17335	00 19	61 45	31	7809	00.24	57 58

OSCAR 7 MODE B

The following notes were submitted by Bob Arnold VK3ZBB and are reprinted with thanks

Although Oscar 7 Mode B (432 MHz uplink), is not as popular in Australasia as in Europe and USA it is usually possible to find VK and ZL stations operating on each pass. Some are regulars, others appear intermittently.

During the past 6 months the following stations have been worked from Melbourne.—

VK1VP
VK2YAJ BJQ
VK3ZUR ZDW BFC ZBB. AMN ZPA, WM
VK4LO
VK5NY, QR, GU, ZPS, MT, ZDQ, NC, SU.
VK6WG, KJ, ZFY, HK, XY
VK7ZAH, LZ
ZL1AVZ
ZL2TFJ, MF, BCG, BFC
ZL3AR, TJG.

Stations in JA and VS6 have been worked by VK5 and have been heard in Melbourne, it should be possible for stations north of 35° Lat. to work these call areas on suitable orbits.

Activity in the Pacific is almost non existent but VK3ZBB and ZL3AR have been heard at ZK1AH, Stewart will have a 432 Tx in the near future to make two way QSOs.

Most stations operate SSB with USB up and LSB down, but on occasions AM and FM modes are effectively used. 10 watts of SSB is sufficient for a good QSO but contacts have been made using less than 300 milliwatts.

A tilted and steerable antenna is desirable.

The regulars on Oscar 7B will welcome calls from new operators particularly those in northern VK, P29 and the Pacific Islands.

SPECIAL OSCAR 7 MODE B TESTS

All users of the 70 cm to 2M Mode-B transponder of the AMSAT-OSCAR 7 satellite are invited to participate in a special three day low power (QRP) test which will occur on June 16, 17 and 18, 1976. The test will begin at 0000Z, 16 June, when the satellite switches from Mode-A to Mode-B on orbit number 7245. It will be kept in this mode by AMSAT Telecommand stations located in Canada and Australia. The final orbit of this three day test will be number 7262 on Friday, June 18.

All stations using the transponder are urged to run **10 watts** effective radiated power or lower, and those who cannot reduce power to this level are asked not to transmit in the 432 MHz uplink passband, since their presence will reduce the effectiveness of the many low power users who will participate in the QRP test. Signal reports sent should include the e.r.p. being used (i.e. RST 569 erp 5W) so that those listening can get an idea of how effective low power can be via AMSAT-OSCAR 7 when the high power stations are not hogging most of the available power.

Remember that one watt into a 10 dB gain antenna system will produce the maximum recommended 10 watts effective radiated power. If an exciter runs 10 watts or more output, a half wave dipole will be a big enough antenna to use, and if more attenuation is needed to reduce the e.r.p. an old piece of lossy coaxial cable can be added to the existing transmission line. It does not really matter how the 10 watts e.r.p. is achieved. The important thing is to run QRP for the three day test and send the results along with a station description to.—

Project Australis, 3 Oliphant Court, Mulgrave, Victoria, 3170. ■

20 YEARS AGO

Ron Fisher, VK3OM

JUNE 1956

Just how should the PMG Radio branch communicate changes in the regulations to Amateur Operators throughout Australia. The Editorial page of the June 1956 issue of Amateur Radio looked at the problem and made a few suggestions.

Along with the publication of this information in AR they stated that it should be simultaneously transmitted over the Federal station VK3WIA.

However VK3WIA never materialised in the form suggested, but over the last month or so tapes with Federal information have been forwarded to each State for inclusion in Divisional broadcasts. Perhaps FE has a voice at last.

An historical note on the opening of the John Flynn Memorial Church in Alice Springs recalled the work of amateurs who assisted the late Rev John Flynn in the formation of the radio communication service for the Inland Mission. Alf Traeger VK5AX/8AX and Harry Kauper VK5BG were two notable participants.

Two Metres, But How. Comps Daw VK5EF told the story of how he eventually got on two, after getting on to a lot of other frequencies first. Recommended reading for all those who tried two metres during the fifties and failed. One of the gadgets that seems to have persisted since immediate post war days and yet has never become over popular is the Panoramic Adaptor. K M Saxon VK7AI described the construction and operation of one in the June 1956 issue of AR.

The Federal Column states that David Wardlaw VK3ADW had taken over the duties of Victorian Federal Councillor from Russell Bradshaw VK3SX. ■

REPEATERS

Ken Jewell, VK3ZNJ
Peter Mill, VK3ZPP

Once again we would be most grateful if more information could be made available to enable the column to continue. In particular we would like to hear from VK6, and the VK4 northern repeater groups. If you are unable to write, send a short note with your telephone number and we will ring you. All correspondence for this column should be addressed to **Peter Mill, 2 Ivy Street, Parkdale, Vic., 3195.** Also we would welcome any suggestions about this column so that we can assess just what the readers want.

FEDERAL NEWS

Advice received from those States who have answered the recent letters from the Federal Repeater Secretariat have indicated that the proposed additional channel and change in repeater numbering could be adopted as policy by the time the Federal convention has been held. Some replies have been received back from a few States regarding the 70 cm band plan but more replies are wanted to give FRS a firm idea of what the opinion is of the majority. However contact with groups around the country shows that the trend is toward the W.A. band plan as will be seen later in this column.

VICTORIAN NEWS

The proposed repeater on channel 3, VK3RSW, in the Otway Ranges has become a step closer with the purchase of equipment for the repeater. The gear will be all solid state Philips type 1680 Tx and Rx and a 25 watt final board. It is expected that the equipment will be assembled and tested in the Geelong area in the near future. Permission is being sought at the present time. VK3RGL is suffering from a small problem at the present time due to low temperatures on Mt Anakie and a recent modification on the mute which is opening up intermittently. It is hoped to rectify this shortly. Also an automatic keyer has been completed and should be installed by the time you read this.

The Bendigo group has been reduced to a one man band for the time being and pressure of business has delayed the installation of the diplexer which will give improved coverage. From Ballarat comes the news that the tests have been very successful and a firm licence application is in the process of being prepared for submission shortly. The range of the repeater is difficult to determine at the present time but even with the low site they have stations mobile 80 km away working into it. More details will be available next month.

In Melbourne the 70 cm interest is increasing with an approach by a second group who propose a service repeater for Melbourne using the same frequencies as Sydney. They hope to have sufficient details for a licence application in a few weeks. The gear will be all solid state commercial equipment with a power output of 50 watts and from the site they have available excellent coverage is expected.

NEW SOUTH WALES NEWS

On the 7th April, 1976 the Sydney UHF repeater was licensed under the call sign VK3RUS with an input frequency of 433.50 MHz and the output on 438.50 MHz. The equipment is a Wilis L10T transmitter and U25 amplifier with a Wilis type UR receiver, and the antennas are 165 metres above the ground. The usual timeout and identification facilities apply to the station. From Gosford Jeff Campbell advises that VK2RAG on channel 5 runs an all valve AWA rig with 30 watts out and is located at the Central Coast Radio Club rooms. It will be re-located at Mangrove Mountain in a few months. For identification the repeater trans-

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2.16	⅝	16	3	No 3007	$1.16
3 08	¾	8	3	No 3010	$1.40
3 16	¾	16	3	No. 3011	$1.40
4.08	1	8	3	No 3014	$1.56
4 16	1	16	3	No. 3015	$1.56
5 08	1¼	8	4	No. 3018	$1.75
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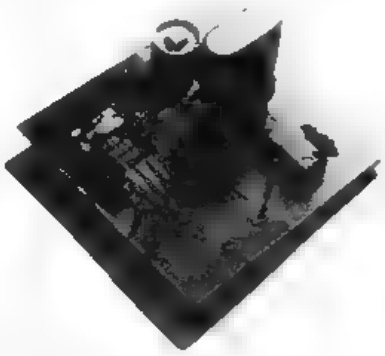

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TASMANIAN REPEATERS

OPERATIONAL

VK7RAA Channel 4 Mt. Barrow/Launceston Area Audible Ident 1000 km Range VK7PF Project Leader.

TESTING STAGE

VK7RHT Channel 1 Mt. Wellington/Hobart Area Audible Ident 100 km Range VK7RR Project Leader.

CONSTRUCTION STAGE

VK7RWN Channel 5 Loons/Ulverstone Area Audible Ident ? VK7ZAQ Project Leader.

m ts its cal sign its location and the time of the day at a speed of 10 wpm every time the repeater is brought up (anyone for CW practice?)

In Sydney the channel 4 repeater, VK2RAS located at Dura , is currently having a 100 foot tower erected at the site wh.ch will double the present he ght of the receive antenna and will no doubt g ve the system a far greater coverage The St George repeater on channel 2 VK2RLE is in the process of being moved from Engadine to a site at Heathcote and details of the equipment will be given when they are aval ab e

QUEENSLAND NEWS

From Mike Adams VK4ZDA comes news of the Gold Coast repeaters. On 2 Mx it was found that water was affecting the homebrew antennas and these are now being replaced by commercial antennas which will also give an additional 3 dB ga n The UHF repeater which has the same call sign as the VHF repeater, VK4RGC, has been licensed and is operating on temporary frequencies unt l the band plan has been officia ly adopted when it will change to the permanent frequencies. The equipment has all been donated by John Willis VK4WN of Willis Communications fame and is similar to that being used in Sydney The equipment is narrow band and the coverage is less than that experienced on the 2 Mx band.

In Brisbane the repeater on channel 4, VK4RBN, will be located at its permanent site by June on Mt. Glorious at an elevation of 800 metres a.s.l With the antennas in use there is an ERP of 80 watts when the system is fed by the power from the rig which is a DYCOM ECHO III from the USA and has a CW ident at 15 wpm F2.

TASMANIAN NEWS

From Hobart great news. The end is in sight after 8 years. Channel 1 Hobart, VK7RHT, has been successfully tested and will be located on the ABC TV tower on Mt Wellington. If the antenna situation is resolved it should be a goer in about 6 weeks and the expected range indicated by the tests should be 100 kms from a mobile The receiver is an STC type 131 with an MPF1000 front end and cascode TIS88 preamp, whi e the Tx is a Philips 1674 with a OOE06/40 final giving a power output of 75 watts, and associated timers and identification. Also n Hobart there is some preliminary work being done for a 70 cm repeater for Hobart and they expect to apply for the same frequencies as Sydney We will give more detai ls as they come to hand.

The Launceston repeater VK7RAA, which has been chugging away for years, s still plagued with the TV intermod problem but work is in hand to ferret this out.

Located at Mt. Barrow which is 4600 ft high the equipment is an al valve Ph llips type 1674 w th an ERP of 40 watts and an F2 CW ident at 12 wpm on channel 4.

AFTERTHOUGHT

Many people just take repeaters for granted and do not consider the time and effort that goes into the construction licensing and maintenance of them This comment is not only levelled at the individual, but to commerc al organisations who are reaping the benefits from the t reless work of a few dedicated enthusiasts. It takes months of work, and up to $2000 cash in some cases, to put a repeater on the a r, not to mention the many cold nights on mounta ns repa ring fau lts. That is why, amongst the complaints about why the repeater is off or why it has such and such a fault, complaints by those who have little better to do than complain it is pleas ng to note that in Queensland there is very real ass stance be ng given by a dealer in Amateur equ pment to the service. ■

IONOSPHERIC PREDICTIONS

Len Poynter, VK3ZGP

All those who have been active over the past few months have no doubt been aware of some very good condit ons since Mid-March this year Some of the new cycle sunspots have been making their presence fe t.

Around April 18th more Cycle 21 spots were observed and at the time of writ ng another large storm was in progress WWV indicating a K index of 8 at 0800 UTC on May 3rd. On 30 April a proton flare was also reported.

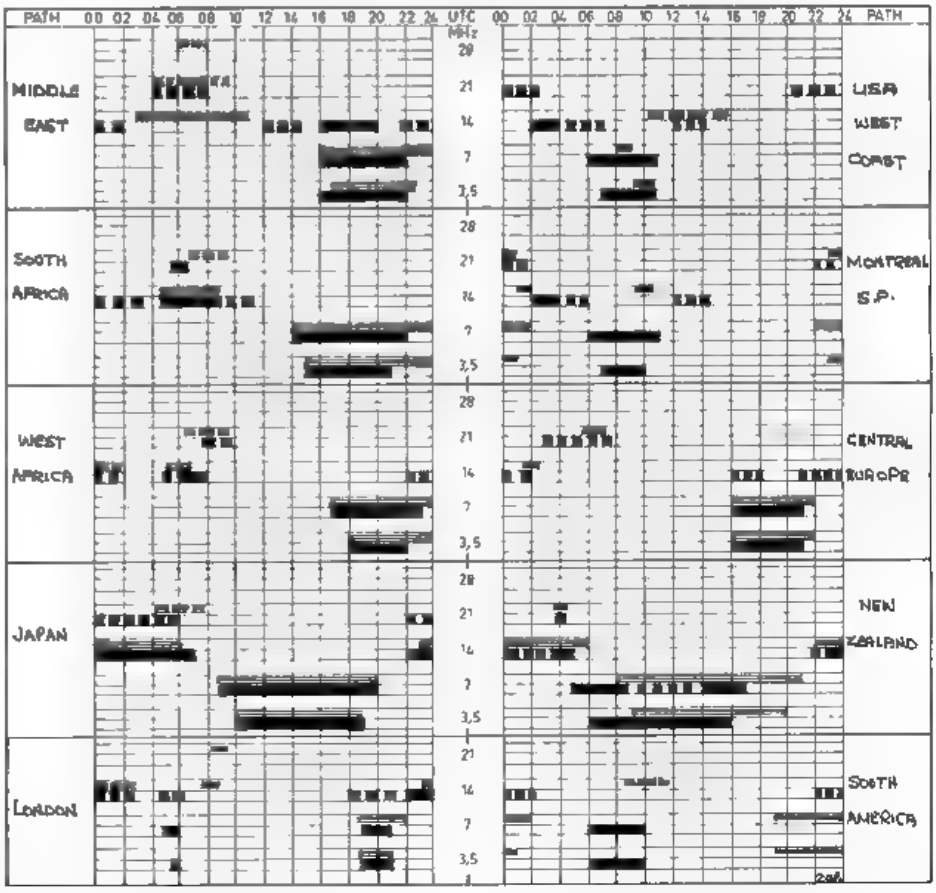
The monthly mean for March sunspots was 23.0 with some relat ve y high daily recordings after 10th March The running smoothed mean for September 1975 was 14 5 Projected smoothed numbers are for June 5, July 5, August 4 and September 4

The prediction chart is drawn from the IPS Graflex series, computer produced by IPS Sydney. The o d MUF, ALF curves are no longer available because of cost problems with their production.

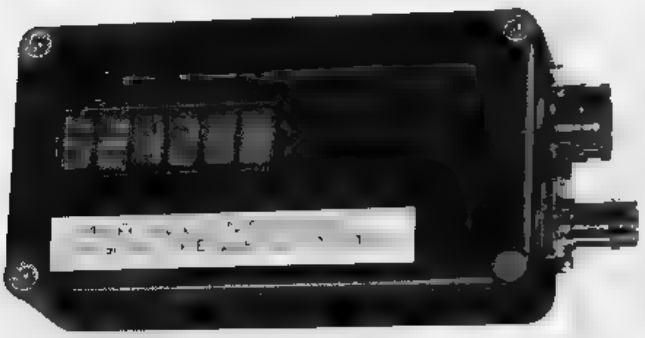
From these printouts, band predictions are produced in coded form I endeavour to transcribe to bar form as shown Two paths are covered. One from Canberra shown as full or dotted bars. The other from Perth shown as full or broken lines. The full lines and bars indicate best times for each band and path based on forward projections of sunspot data and on the experience of IPS and their knowledge of propagat on conditions. Generally they are valid for better than half the month, but not every day. If you know the signs and can read them, you will know when.

The broken or dotted l nes and bars are for times genera ly of high solar activity. Such as prior to the geomagnetic storm and/or the break-up or return to normal

It st ll is argely guess work; no one can really pred ct, with great accuracy, conditions six weeks ahead However, once again those who know the s gns need only the indices available to do their own predicting. I have arranged the charts in such a way as to fol ow the great circle bearings from the respect ve take off area Reading from left and down the chart, short path, Middle East, Africa, etc. Right hand s de down the page is short path North America, long path Europe, etc. Hope this helps you get a little extra out of the charts.



50 MHz DIGITAL FREQUENCY METER and 500 MHz PRESCALER



from Microwave Modules, U.K.

MULTIPLEXED 6 DIGIT LED DISPLAY, CONSTANTLY UPDATED FOR CONTINUOUS FLICKER FREE DISPLAY FOR A CONSTANT FREQUENCY READING.

*Digit height 10 mm *Display width 45 mm *Case size 111 x 60 x 27 mm *Frequency range 0.45 to 50 MHz *Sensitivity, better than 50 m V RMS over above range *Input connector 50 ohm BNC *Input Impedance 200 ohm approx. *Power Connector 5 pin 270 locking DIN socket (plug supplied) *Power requirements 11-15 volts DC at 200 mA approx.

MODEL MMD050 Price $140 add pack and postage, $1.

500 MHz PRESCALER

THIS PRESCALER USES HIGH SPEED ECL TECHNOLOGY TO ACHIEVE 10 OPERATION TO A FREQUENCY OF 500 MHz.

*Case size 111 x 60 x 27 mm *Frequency range 50-500 MHz *Sensitivity, better than 200 mV RMS over above range *Input Impedance 50 ohm, BNC connector *Power requirements 11-15 volt DC at 100 mA approx.

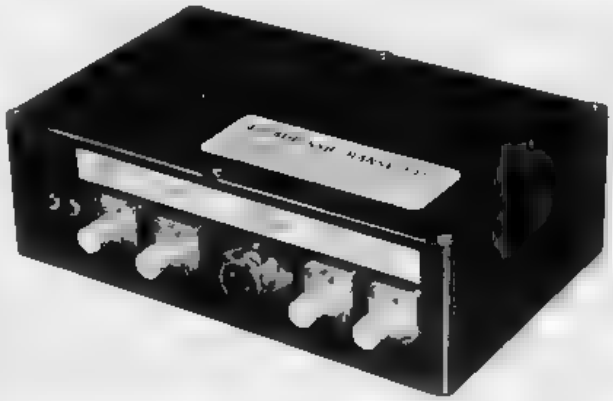
MODEL MMD500P Price $60 add pack and post $1.

432 TRANSVERTER Model MMT432

FEATURING COMBINATION OF A LOW-NOISE RECEIVE CONVERTER AND A LOW-DISTORTION TRANSMIT CONVERTER PRODUCING A SPURIOUS-FREE LINEAR SSB SIGNAL, PARTICULARLY WHERE HIGH STABILITY AND SENSITIVITY ARE OF IMPORTANCE.

*Drive 1 m W to 500 m W *28 MHz I.F. *Output 6 watts *Modern Microstrip Techniques *Internal Antenna and T/R Relays *Power requirement 12 volt nominal at 150 mA 1.5 amp. peak *Case size 187 x 120 x 53 mm.

MODEL No. MMT432 Price $195 add pack and post $2.



NEW READY-TO-OPERATE MODULES AVAILABLE IN THE SALES PROGRAM OF VHF COMMUNICATIONS

[illegible]

Microstripline, Schottky diode mixer
IF 26-30 MHz or 144-146 MHz
Noise figure typ 8.5 dB
Overall gain 25 dB **Price $58.**

432 MHz CONVERTER

2 silicon pre-amplifier stages MOSFET mixer All UHF circuits in microstrip technology.
Noise figure typ 3.8 dB.
Overall gain typ 30 dB.
IF 26-30 MHz or 144-146 MHz 9-15 V 30 mA **Price $45.**

144 MHz MOSFET CONVERTER

Noise figure typ. 2.8 dB
Overall gain typ 30 dB
IF 26-30 MHz 9-15 V 20 mA
Price $39

VARACTOR TRIPLER 144/432 MHz

Max input at 144 MHz 20 W (FM, CW) 10 W (AM)
Max output at 432 MHz 14 W
Price $45.

VARACTOR TRIPLER 432/1296 MHz

Max. input at 432 MHz 24 W (FM CW) - 12 W (AM)
Max output at 1296 MHz 14 W
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Pack and Post $1

All modules are enclosed in black cast-aluminium cases of 13 cm by 6 cm by 3 cm and are fitted with BNC connectors Input and output impedance is 50 ohms. Completely professional technology, manufacture, and alignment. Extremely suitable for operation via OSCAR 7 or for normal VHF/UHF communications.

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VHF-UHF
AN EXPANDING WORLD

Eric Jamieson, VK5LP
Forreston, 5233

AMATEUR BAND BEACONS

VK0	VKOMA, Mawson	53.100
	VKOGR, Casey	53.200
VK1	VK1RTA, Canberra	144.475
VK2	VK2WI, Sydney	52.450
	VK2WI, Sydney	144.910
VK3	VK3RTG, Vermont	144.700
VK4	VK4RTL, Townsville	52.500
	VK4RTT, Mt. Mowbullan	144.400
VK5	VK5VF, Mt. Lofty	53.000
	VK5VF, Mt. Lofty	144.900
VK6	VK6RTV, Perth	52.300
	VK6RTU, Kalgoorlie	52.350
	VK6RTW, Albany	52.950
	VK6RTW, Albany	144.500
	VK6RTV, Perth	145.000
VK7	VK7RTX, Devonport	144.900
VK8	VK8VF, Darwin	52.200
3D	3D3AA, Suva, Fiji	52.500
JA	JD1YAA, Japan	50.110
ZL1	ZL1VHF, Auckland	145.100
ZL2	ZL2MHF, Upper Hutt	29.170
	ZL2VHF, Palmerston North	52.500
	ZL2VHF, Wellington	145.200
	ZL2VHF, Palmerston North	145.250
	ZL2VHG, Palmerston North	431.850
ZL3	ZL3VHF, Christchurch	145.300
ZL4	ZL4VHF, Dunedin	145.400

The March issue of "Eastern Zone News" from Gippsland, Victoria, has 38 pages packed with information, and is a credit to those producing it. Included is a request for supporters to erect and maintain a beacon on 2 metres for the Latrobe Valley area, in view of the present increase in interest in 144 MHz SSB. Approval was given at a meeting of the Zone in February for the beacon project to commence, and to apply for a licence.

Further beacon news is contained in "QRM" the newsletter of the Northern Branches of the WIA Tasmanian Division, where mention is made that a radio shack has been erected at Lonah to house a 70 cm beacon, and a 2 metre repeater. Both are in the final stages of completion, and air tests are likely soon. Joe, VK7ZGJ reports their 6 metre beacon is still awaiting PMG approval for its erection on 7EX hill.

Under the heading of "WANTED" in "QRM" is a request for windmill generators, 12, 24, 32, 48, 60 and 110 volts AC or DC etc. Mains regulators, 180 to 280 volts input, 230 or 240 volt reg. output. Daniel VK7ZDA is making these requests, as he is in the process of moving again. Looks very ominous that he might be heading for the sticks without power, and needs something to keep the 2 metre equipment going!

As very few amateurs seem to be on the air at the moment on VHF, news of their activities is somewhat scarce, so there will be a few reprints included this month. They should be of interest to many.

The first comes again from the "Eastern Zone News" and refers to amateur radio in Malaysia, which is encouraged by the Jabatan Talikom (Telecoms Dept.), but there are less than 100 licences on issue. Bands available are 1.8 to 2.0 MHz, 3.5 to 3.9, 7.0 to 7.1, 14.0 to 14.35, 21.0 to 21.45, 28.0 to 29.7, 420 to 450 MHz, 1215 to 1300, 2300 to 2450, 3300 to 3500, 5650 to 5850, 10,000 to 10,500 and 21,000 to 22,000 MHz. 150 watts DC input all bands except 1.8 which is 10 watts. All the usual modes of transmission are permitted. It appears spark transmissions are permitted on the 7, 14, 21 and 28 MHz bands!

Spot frequency operation is permitted on 2 metres, namely, 144.900 5W DC input; 145.925 15W; 147.900 to 147.980 5W. Two metre stations operate only from the licencee's address. Not portable or mobile.

Because of the renewed guerilla threat since the end of the Vietnam war, no walkie-talkie radios are allowed to be imported, sold or operated by the general public. Reason being, should these fall into the hands of the guerillas, they would be used against the countries interests by setting up cheap radio networks in the jungle hide-outs. Hence no 27 MHz operation takes place, and therefore the special restrictions placed on the Amateur Radio Service, such as no 11 or 5 metre band allocations, and the limited 2 metre frequencies available.

Permits are available for portable or mobile operation on payment of a further fee, but portables or mobiles shall not work each other; therefore, no field days! Also, these stations are limited to 10 watts on 160 metres, and 25 watts on all other bands. No amateur may operate marine-mobile, or in a dock, harbour, or on a ship or aircraft. No portable or mobile can operate in the 144-148 MHz band. So, no FM!

Separate licence required for broadcast band listening. Regular checks are carried out for unlicenced operation. There is a $1000 fine, or 12 months jail, and the receivers (including TV) are confiscated.

The Malaysian Amateur Radio Transmitters Society is at rather a low ebb at this time. Such is not to be wondered at considering less than 100 licenced operators in the whole country. Perhaps we in VK are not too badly off after all . . . Whilst on that point, how would you like to operate with the density of 20,000 on 2 metres FM simplex? No repeaters. That's what the JAs have to do, and the number is on the increase, plus 144 MHz SSB is also becoming more popular. Thanks for good old VK.

SIX METRES IN VK4

Claud VK4UX writes that on 31-3-76 from 0456 to 0555 he worked 16 Japanese amateurs, covering districts 0, 1, 2 and 7. Signals to 9 plus. At 0528 to 0530 they dropped to S7, but returned to S9 again. The band folded in its usual way, very quickly. Claud thought Ross VK4RO might have been in on the deal, but believed the signals did not get much below Gracemere where he lives. So it looks as though the equinoxial period once again suited some areas, but nothing as far south as VK5.

Claud also mentions there are a few stations in Rockhampton operating 144 SSB. VK4MM, VK4ZKA, VK4ALM and VK4UX. On 29/3 at 1039 VK4ZKA and VK4UX worked Bob, VK4ZZE in Bundaberg, with fair signals each way, and on 30/3 Bob VK4ZZE got down to Brisbane and Gympie using 144 SSB, and also to northern NSW, then his transmitter packed up. (That is what happens when you put too much strain on them over such distances . . . 5LP).

It is very encouraging to those of us in the south to see the increase in interest and activity on 144 MHz SSB in VK4. With more stations around, contacts must eventually be made to other call areas. The main hope is that 2 metre operators will not become discouraged at any lack of contacts and leave the band. 144 has never had contacts of the type to be found on 6 metres; you have to work for what you get, but the reward is there. I like to think back on my own situation. I have a 30 dB loss hill to the west of me and for years I used to think I would never have an opportunity of working any 2 metre stations in VK6. So much so that I erected a special 10 el. yagi on top of one of my favourite hills nearby with the idea that when the band opened to VK6 I would rush up there with my 2 metre mobile and work them. It never turned out that way. One day, the band opened really well into Adelaide, S9 plus, and finally after much calling I had my first contact with VK6, only strength 4 to be sure, but I made it — from home! Since then, by dint of perseverance, I have now had more than 12 such contacts. The reward was there, I had only to be there at the right time to reap it. So good luck you guys in VK4, your rewards will eventually come.

MOONBOUNCE REPORT

Lyle VK2ALU once more reports in "The Propogator" on the efforts of VK2AMW at Dapto. Due to being back in hospital, Lyle speaks highly of the work being performed by Charlie VK2ZEN and Charles VK2MT during the March EME tests. JA1VDV and F9FT were worked and VE7BBG, I5MSH and VE4JX were heard. Weak but unreadable signals were heard from SM5LE and ZE5JJ. VK2AMW echoes were between 6 and 10 dB above noise during the test periods.

Lyle also reports VK5MT is working towards 432 MHz EME capability, while I5MSH is hoping to get RTTY equipment to go with his fine moonbounce set-up.

The Mt. Gambier (VK5) SERG Newsletter "Blurb" contains some interesting information of the activities of Chris VK5MC and his 144 MHz EME efforts. During March W6PO and WA2BIT were both worked by Chris, with reports to W6PO being 559, and WA2BIT, 549. Signals were heard for 30 minutes with the moon passing through the middle of his rhombic "window".

Stations worked by Chris up to 1-4-76 have been W6PO using a transmitter with an 8877 in the output, 160 el. collinear, and the pre-amp for receive being a U310 JFET. VE7BQH, 160 el.; W8KPY, 3CX1000A, 8 x 16 el. KLM yagis, U310. W8KPY, 8877, 16 x 12 el. KLM yagis, U310. K1WHS, 2 x 4CX250B, 160 el., 2N5397. W4DFK, 8877, 160 el., U310. W7CNK, 8877, 8 x 16 el. KLM yagis, U310. JA6DR, 2 x 4CX250B, 16 x 9 el. yagis, U310. WA2BIT, 8877, 160 el. VE2DFO, 2 x 4CX250R, 160 el., 2N5245. KH6NS, 2 x 4CX250B, 4 x 16 el. KLM yagis, U310. WA7BJU, 8877, 8 x 14 el. KLM yagis, U310. WA7KYZ, 8877, 8 x 14 el. KLM yagis, K2RTH, 160 el. collinear.

From the above it appears that the transmitters and receivers follow fairly closely to accepted patterns, but most experimentation seems to be taking place with the antenna, with even division between banks of yagis and the 160 el. collinear.

I would still like to hear from other EME operators in VK from time to time please, to let others know what you are doing. And what about some of you secretive ones letting the rest of the world know how you are proceeding with your EME capabilities? I know who you are, but would like you to tell me first. VK5 might come right up to the front in EME activity in the not too distant future!

That is all for now. Only one letter this month, so will conclude with this for you to think about: "Our forefathers did without sugar until the 13th century, without coal fires until the 14th, without buttered bread until the 16th, tea or soap until the 17th, without gas, matches or electricity until the 19th, without cars, tinned or frozen food until the 20th. Now, what was it you were complaining about?"

The Voice in the Hills. ■

MAGAZINE INDEX

Syd Clark, VK3ASC

CQ MAGAZINE November 1975
A Low Power COSMOS Electronic Keyer in Two Versions; The National AGS Receiver; Ohm's Law of the Universe; Fire in the Ham Shack; Some Ideas on Code Practice; Israel: How to get an Israeli QSL Card; Highly Sensitive Solid State 6 Metre Converter; Ferrite and Powdered Iron Core Toroids.

December 1975
The DCX/CLG SSTV Monitor; Just Hams; A 160 metre Antenna; Results 16th Annual 160 Metre DX Contest; 3-1500 MHz 10 dB Amplifier; A New Twist to an Old Antenna; A Phone Patch Indicator; Miniature Solid State Tone Encoders Replace Reeds; Review; Heathkit HD-1250 Solid State Dip Meter; Now What Have I Done; QRP; Getting what you built to work.

January 1976
Solar Activity Update; The Transition Years; A Solid State 13 W RF Amplifier for 1.8 MHz; Radiant Photons and Other Scintillations; Two-Metre Repeater Growth; World Wide WPX/SSB Contest; KLM Multi-2000 2 metre FM/SSB/CW Transceiver; The Impossible Challenge: DXCC QRPp; Moonbounce Antennas and EME; Interlaced Elements for Yagi Antennas; Lighting Brightness, Using Slides; Adding Product Detectors; VHF Antennas.

QST March 1976
RFI Primer; Mobile Marine Under Sail; A VOX for a Very Small Box; Learning to Work with IC's — Pt. 3; A Cure for Intermod Alley; A Homorphic

Speech Compressor; Make Friends with dB; Working Towards WARC; New Tricks for Old Club Programme Nights.

RADIO COMMUNICATION February 1976
A Simple AF RTTY Terminal; An Experimenter's Mast; Principles and Characteristics of FETs. ■

QSP

PROVOCATION OF THE MONTH
"Why support the WIA, I've had no AR for months" — comment by an unfinancial. ■

SATELLITES
"Conclusion. The next 10 years will be an extraordinarily active and revealing period for satellite communications. Two new satellite services — aeronautical and maritime — will receive decisive tests of economic viability. Broadcast satellites will come into sharp focus and probably begin to proliferate. The greatest expansion will occur in domestic systems, used for telephony, data and television. Their growth will begin to be limited by the orbital arc and pressure will develop to move systems to higher frequencies. International service provided by INTELSAT will expand steadily and call for both technical and operational developments to keep pace with the demand. It will be the second decade of communication satellite service and probably its most important from a historical viewpoint". From an article in Telecommunications Journal Feb. '76 entitled "The future outlook for communication satellite applications", by Albert D. Wheelan of the Hughes Aircraft Company as contained in a paper presented at the World Telecommunication Forum Technical Symposium in Geneva Oct. '75.

MOBILE AND PORTABLE OPERATIONS
"The FCC has proposed deleting the requirement that advance notice be given when amateur radio stations licensees operate their stations at portable or mobile locations for extended periods. It has also proposed to delete the requirement that transmissions from amateur stations operated at portable or mobile locations be identified as such". Worldradio Feb. '76.

IGNITION RFI
The Department of Communications (in Canada) has published new federal requirements for the control of interference with radio reception caused by spark ignition systems of internal combustion engines, to become effective Sept. 1, 1976 for all engines (except aircraft) manufactured in Canada or imported after that date. The rules have teeth". QST Mar. '76.

ARRL EDUCATIONAL PROGRAMME
QST editorial Mar. '76 says, "In discussions with the Commission (F.C.C.) during late 1975 there was developed the concept of a new approach to amateur licensing whereby the League (ARRL) would conduct, through its affiliated clubs, training courses. Provided the content and conduct of these courses were satisfactory to F.C.C. the graduates of such courses would be certified by ARRL as being eligible for amateur licences and licences would be issued forthwith by FCC". "We are going to seize upon this opportunity", says the editorial.

VU7 PREFIX
A note in the Winter '75 issue of the Indian Radio Amateur advises that their Ministry of Communications has allocated the call sign prefix VU7 to amateurs operating from the Andaman, Nicobar and Laccadive groups of islands with apparent effect from 2-12-1975. The previous prefix was VU2 the same as anywhere else in India.

STOLEN EQUIPMENT

Reported stolen from car parked overnight at Tullamarine Airport is the following— Transceiver Drake TR22 144 MHz, serial 72007 fitted with Rptr. Ch. 1, 2, 4 and simplex 146.000, 146.500, 146.940.

Amplifier 144 MHz 10 W type KLM PA2-12 B.

"Sideband" Transceiver fitted with 27.125, 27.880, 27.890, 27.900 and 27.910 MHz xtls (Marine demo).

Stereo cassette/radio player.

All leads were cut after forcing door lock. Any information please to VK2AYD Phone (02) 452 1623 (call collect) ■

HAMADS

- **Eight lines free to all WIA members. $3 per 3 cm for non-members.**
- **Copy in typescript please or in block letters to P.O. Box 150, Toorak, Vic. 3142.**
- **Commercial advertising is excluded.**
- **Closing date: 1st day of the month preceding publication. Cancellations received after about 12th of the month cannot be processed.**
- **QTHR means the advertiser's name and address are correct in the current WIA Radio Amateurs Call Book.**

FOR SALE

Tabletop 1200 W PEP linear, 80-10 metres, complete kit of parts, $110. Asahi 80-10 metre mobile antenna set, as new, together with new, unused, bumper mount, $75. Gutter mount 2 metre ¼ wave mobile whip, $5. Yaesu YD844 de luxe desk mike, as new, $30. VK3ARZ, QTHR (03) 232 9492.

FT101 Transceiver, bought May 1975, with fan added, little used, absolutely as new $480. VK3BFB, QTHR, Phone (03) 93 1638.

TCA 1677 Transceiver, complete with mike, plugs and circuit, very good condition, $35 o.n.o., also Pye Base Station complete with mike and power supplies, model Tx A3302L; Rx, A3004L, $35, good condition o.n.o. VK3ALT, QTHR, Phone (03) 277 2337.

Trio 9R59DS Rx with handbook, as new, $110 o.n.o. Scaler Magnabase and whip, $25. G. Hambling C/o Cowell P.O. 5602 S.A. or Phone Cowell 39, A.H. 144.

Back issues of EA (1967-1975) and Practical Electronics (1969-1975), any reasonable offer. Richard Jago VK4ZTD/1, Gowrie Private Hotel, Northbourne Ave., A.C.T., 2601. Phone (062) 49 0708 (Bus.) (062) 49 6033 A.H.

Deceased Amateur's Estate. Yaesu FT401 Transceiver, FT100 Mobile Transceiver, Trio CS 1554 Double Beam CRO 67' crank-up tower, realistic DX 160 Rx B & K TV analyst Delica GDO meters, transformers, several parts circuits, ham radio and TV. No reasonable offer refused. Phone Mrs. Stewart (02) 668 9407.

Eddystone 840A Comm. Rx AC/DC $80.00. Phone (02) 525 5574.

Swan 240 Transceiver 20-40-80 m with AC supply, good condition $195. Eddystone 770 V Rx VHF and UHF 140-500 MHz $150, Tech TE-20D RF sig.-gen. $25. AWA AF sig.-gen. $45, Pye 734 mobile all solid state converted with 4 and 40 $95. VK3BEJ, QTHR, Ph. (050) 24 5814.

Panoramic Adaptor New London Instrument Co. 230/115 V, 50-60 Hz, 200 kHz spread, excellent condition $70. VK2BTY, 4 Taylor St., East Gordon, Ph. (02) 498 3926.

Heathkit SB400 Tx usb/Lsb 180 W PEP 2 x 6146 final 80-10 m inbuilt power supply together with SB301 Rs usb/Lsb 80-10 m with extra AM and CW filters. Crystal for RTTY reception. Work transceive or separate Rec. and Transm. All handbooks, both units very clean and good working order. Full price $375 firm, will not separate. J. Lauten VK4VK, 6 Tosti St., Sorrento, Qld., 4217. Ph. (075) 38 4164 A.H., (075) 31 6201 Bus.

Ideal Ham QTH, Blue Mountains NSW. Contemp.-elevated house, good shack and car parking under 17 sqs., living, large block suits antennas. Magnificent views, sewered, many extras to delight XYL. $38,500. VK2HS, Ph. (047) 51 3534, QTHR as per VK2BHS.

Galaxy V Mk. 2 with AC PS, remote VFO and spare tubes, Xtal calib., VOX $350. VK4DV, P.O. Box 380, Rockhampton, Qld., 4700.

Ken KP202 Transceiver with nicads and suitable charger CHB, new CH4 old Chl 144.48 x 144.80, exc. condition with original pkg. and manual $110. Ken VK2JD, QTHR, Ph. (02) 639 8020.

Trio Kenwood TS520, immaculate cond., just out of warranty $475. CW mic. VK2AAM, Ph. (049) 2 1101 A.H.

Yaesu FTS01 with power supply, latest model, new condition $500. VK1BH, QTHR, Ph. (062) 88 6062 Bus. (062) 55 5500.

SILENT KEYS

It is with deep regret that we record the passing of —

Mr. W. O. YATES	**VK2AWY**
Mr. J. P. FRANKLIN	**VK2ALP**
Mr. R. C. GODSALL	**VK2ARG**
Mr. G. R. STEWART	**VK2AZE**

Hallicrafters SX111 Amat Rx in first class order, complete with handbook, $125. VK4CP, 6/8 Phillip St., Toowoomba, Ph. (076) 32 8139.

Yaesu FTDX401, unmarked, brand new condition, fitted 11 m Xtals, complete with handbook, matching speaker, brand new mike and new spare set 6HF5's, $400. J. Moyle VK4ZT, Yarwun, 4694, Qld.

Power Supply, dual o/p 20 V 11.5 A, 20 V 5.25 A, series regulated, short-proof, circuit supplied, WT 40 kg, $90. P. Hadgraft, 17 Paxton St., Holland Park, 4121, Qld. Ph. (07) 224 2343 Bus. or (07) 397 3751 A.H.

Heathkit HW101 Transceiver, complete with AC PSU, $400. Peter Smith VK1DS, QTHR, Ph. (062) 88 5001.

Collins Rx R390/URR, 230 V AC, 0.5-32 MHz. OTS coverage, some 30 tubes, exc. cond., any sensible offers for this superlative Rx? VK3NW/2BNW, 7 Elsmore Ave., Killara, 2071. Ph. (02) 498 3366.

Hammarlund HQ 170 Rx 160-2 m amateur bands. Also KW Electronics Viceroy Tx 80-10 m amateur bands, $280 o.n.o. for the pair. VK2ATT, QTHR, Ph. (02) 476 2699.

WANTED

70 cm Transverter. I have an FT200 Richard Jago VK4ZTD/1, Gowrie Private Hotel, Northbourne Ave., A.C.T., 2601. Ph. (062) 49 0708 Bus. (062) 49 6033 A.H.

Part-time draftsmen for AR. Regular output required. Terms negotiable. Write, with qualifications, to Executive Office.

Service Manual or any technical information on Grundig 500A 13 band transistor Rx. To buy, borrow, copy. Every care taken. J. Flower VK6JF, 132 Hare Street, Kalgoorlie, W.A. 6430.

Short Loan or buy "Radiocommunications, December, 1964". K. Postler VK5KI, QTHR.

Circuit Diagram, loan or copy, B40 Admiralty high frequency receiver. P. Hadgraft, 17 Paxton St., Holland Park, Qld., 4121. Ph. (07) 224 2343 Bus. or (07) 397 3751 A.H.

Handbook and/or circuit for copying of AWA car phone unit MR20B, low band 3 ch. with 6146 final. Leo Fowler VK3ZGF, QTHR, Ph. (03) 25 3968.

Yaesu FT221 2 metre transceiver. Also required a useful item for the construction of an amplifier using a 4CX250, especially a socket and squirrel cage type blower. Contact Mark Spooner VK5ZVQ, 30 Milne St., Vale Park, 5081. Ph. (08) 261 1360 A.H.

FT101 or similar type HF transceiver. A Parr VK4ZIS, 127 Hyde St., North Rockhampton, 4701.

Teletype Model 14 TD Transmitting Distributor. VK3ARY, QTHR, Ph. (03) 277 4786.

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